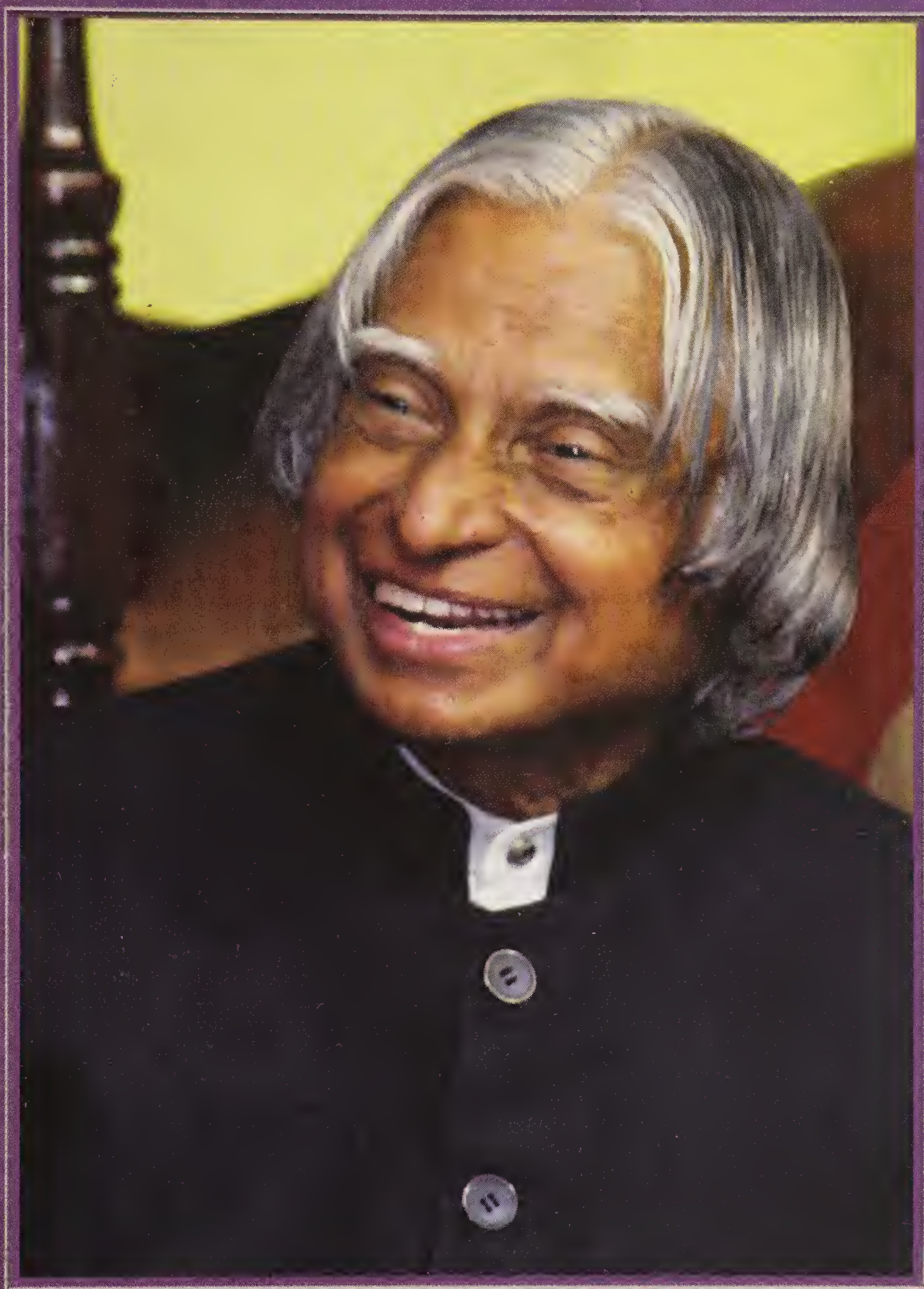



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Dr. APJ ABDUL KALAM
SELECTED SPEECHES

VOLUME II
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1

National Affairs

Evolution of a Beautiful India

ON THIS IMPORTANT day on the eve of 55th Republic Day of India, I am indeed happy to greet all the billion citizens of our country including those living abroad. I also greet the members of the armed forces and paramilitary forces who guard our frontiers on the land, the sea and the air, and also internal security forces. I would like to share some of my thoughts for evolution of a beautiful India, combining economic prosperity and value system drawn from our civilizational heritage.

Indian economy shows a very robust and consistent growth, indicated by the recent 8.4% GDP growth in the second quarter of 2003-2004. Our foreign exchange reserves have crossed the \$100 billion mark and are continuously rising. The rupee is steady and the middle class resurgence and the domestic buying power are on the rise. This has made our economy one of the fastest growing in the world. The time has come for these economic benefits to reach speedily the rural population through development programmes such as PURA – Providing Urban amenities in Rural Areas and Interlinking of Rivers. Economists all around the world predict that by the year 2020, the world economic scenario will be completely different from what it is today, and that India will occupy the pride of position.

Indian industries in certain sectors have matured to be very responsive to the national and international needs and have shown steady growth in spite of earlier adverse predictions. Interest rates from the banks need to be more proactive to stimulate the growth of the right type of small and medium scale industry and agro food processing industries. The combination of entrepreneurship education

in the schools and colleges, the hassle free flow of venture capital and evolution of good market will give additional momentum for national growth.

For the next five years, with certain progress behind us, the challenge we have is to launch a major thrust for attaining national prosperity. We should convert the present opportunity and work towards giving our future generations a competitive nation which has the following characteristics :

- (a) A Nation that is prosperous, healthy, secure, peaceful and happy.
- (b) A Nation where the rural and urban divide has reduced to a thin line.
- (c) A Nation where there is an equitable distribution of energy and quality water.
- (d) A Nation where agriculture, industry and service sector work together in symphony, absorbing technology thereby resulting in sustained wealth generation leading to higher employment potential.
- (e) A Nation where education is not denied to any meritorious candidates because of societal or economic discrimination.
- (f) A Nation which is the best destination for the most talented scholars and scientists all over the world.
- (g) A Nation where the best of health care is available to all the billion population and the diseases like AIDS/TB, water borne diseases, cardiac diseases and cancer are extinct.
- (f) A Nation where the governance uses the best of the technologies to be responsive, transparent, easily accessible and simple in rules, thereby corruption free.
- (i) A Nation where poverty has been totally alleviated, illiteracy and crime against women are eradicated and the society is unalienated.
- (j) A Nation that is one of the best places to live in on the earth and brings smiles on a billion faces.

These are the ten dimensional transformations needed for a competitive India and we have to work for.

For continuing our mission of national development and economic growth in our subcontinent, peace is a paramount ingredient. Most nations have realized that low intensity proxy wars, deterrence-based build-ups and real wars are too expensive detractors from the perceived visions of development. The development of the society also weans away its people from destructive activities of alienation, leading to celebration of peacemakers.

When guns are silent,
Flowers blossom on the earth;
Fragrance engulfs good souls,
Who created beautiful silence.

India will always be grateful to the successful peacemakers.

When I assumed office on 25th July 2002, I addressed the need for unity of minds becoming one of the focused missions for our nation. Recently fifteen Gurus, Acharyas, Swamijis, Maulavis, Reverend Fathers, spiritual leaders, devotees and the representatives of many religions met at Surat in the presence of His Holiness Acharya Mahaprajna and deliberated for two days and took vital decisions leading to the religions graduating as a spiritual force. Also, they have declared that the nation is bigger than any leader or individual or an organization. They had collectively evolved five inter-religious projects for implementation. Nation's best wishes to our spiritual leaders and their mission of transforming religions into a spiritual force.

Also certain challenges before the nation are to be addressed collectively in the immediate future to facilitate faster pace of national development.

Our scientists should become civic scientists and contribute towards societal transformation. Civic means concerning or affecting the community or the people. In the new capacity, scientists step beyond their campuses, laboratories, ministries and institutes and move into

the centre of their communities to engage in active dialogue and action with their fellow citizens. They should ask themselves a question, how their knowledge can make an impact on the common man's life? Our civil servants and others in the service sector should become fearlessly people-friendly, have a positive attitude, and provide responsive, proactive, transparent and unbiased administration and service to the billion people.

Assent has been accorded for the 86th Constitution Amendment Act – Right to Education Bill for children between the age group of 5 and 14 years. Urgent action is needed for providing suitable school infrastructure and appointment of good teachers for running the schools for providing quality education to the children blended with the modern technologies of e-learning and tele-education. While doing so a review of the syllabus is also required to prevent overloading of the children for ensuring blossoming of their creativity.

The nation's vision of developed India requires greater thrust to scientific and technological advancements. All our IITs, IIMs have graduated as world class brand institutions in addition to the century-old premier institution – Indian Institute of Science, Bangalore. These characteristics must be preserved and nurtured. We should also encourage universities to become cradles of higher learning and research, contributing generation of high skilled global human resource force.

Often, we have witnessed that many important national examinations have been the target of attack by a select group of corrupt individuals who undermine the very fabric of secrecy and transparency in the conduct of these examinations. While we should deal with such individuals with sternness to protect the image of our national selection system and the quality, we should also find technological solution that can ensure tamperproof examination system.

With farmers in focus, farming technology as their friend, and food processing and marketing as partners is indeed the second green revolution. From now on to 2020, India would have to gradually increase the production to around 400 million tonnes per annum. The increase

in the production will have to be done under the reduced availability of land from 170 million hectares to 100 million hectares with reduced water availability using technological inputs.

Institutions of pharmaceutical sciences and pharma industries need to evolve an integrated and comprehensive National pharma Vision to meet the challenges of design to drug development, production and marketing. The major challenge before the Pharma community is to prevent the entry of spurious drugs and eradicate its presence in the market.

With our self-reliance in our space programme it is time we should enter into the global market aggressively. The exploration of the moon through 'Chandrayaan' and keeping our sight on the Mars will electrify the entire country, particularly young scientists and children.

Modernization of our armed forces with force multipliers is indeed progressing to meet the national security needs. Defence technology has led to the development of long range missile systems and supersonic cruise missile, Light Combat Aircraft, electronic warfare systems, radars, under-water sensors, combat vehicles and armaments. The Indo-Russian joint venture programme - BRAHMOS - is one of the leading examples of development, production and marketing of state-of-the-art missile system.

Our power generation capacity of 100,000 megawatts has to be tripled by the year 2020. In addition to the power generation from the conventional sources we need to enhance the power generation capacity through non-conventional energy sources to attain power security. Also the present nuclear capacity of 2700 megawatts should be enhanced to more than 20,000 megawatts by 2020. Desalination plants can be co-located with the future nuclear power plants for converting seawater into drinking water. We need to establish large solar farms of 800 to 1000 megawatts capacity in many areas to augment the energy requirements.

Every academic institution and R&D organisation is a reservoir of knowledge. Technology will also spin off to societal products which are cost-effective, high-quality and available to the people in time. Thrust is required in Nano science and biotechnology to achieve leadership in these areas in the coming decade. The scientists and technologists must undertake a health mission “Let my brain remove the pain”. The scientific community must realize that the competitiveness can come only by integrated mission-driven programmes partnered by academy, R&D organisation and industry.

The status of environmental cleanliness is one of the indicators of development of a nation. As a nation, we have to keep our environment clean and tidy. This is essential for better health conditions of all the citizens and also for presenting a wholesome and aesthetic atmosphere for us and also the tourists visiting our country. It is essential that we keep all our places of worship and rivers clean and tidy to preserve their innate divinity. Each one of the States may promulgate appropriate local laws for promoting harmonious environment in their regions.

The general elections for 14th Lok Sabha will take place in early 2004. I was thinking what could be the manifesto of the competing political parties for the election. India has more than 540 million people upto the age of 25 years. India is a nation of youth. During my interactions with the youth of our country, two aspects have come out very clearly. One is that the young have a passion, self-respect and dream to live in developed India. Second, they want to live in a corruption-free India. I can see these two are glowing in their eyes. I am also convinced that we should build developed India in a time-bound way to prevent instability in the society. Hence the manifesto of the political parties has to take into account their aspirations and design them to meet the dream of the young and be resonant with their aspirations with identified missions and action plan. Every political party must clearly state their vision, action plan, and approaches for the developed India vision 2020 and how fast they can realize these missions in quality and quantity.

Every citizen has got a role to choose the right representative to the Parliament and Legislatures, whose vision is that of national development and who has the concern for his/her constituency and the people. The right to vote is the greatest power given by the democracy to you, so that you can reinforce further democratic values. I would like to appeal to all eligible voters to exercise their franchise without fail, fear or favour. Large voter turnout will be the first step towards realization of developed India 2020, and the second step would be to become enlightened righteous citizens.

Which is the starting point, for the character evolution in the nation? Let me share with you an incident, which took place somewhere in Nagaland. I was talking to a group of 600 persons consisting of young children, their parents and teachers. The topic I selected was the knowledge society, foundation for a developed India. One boy who was studying in 10th class, asked me, “Mr. President, tell me is it possible for a nation to get transformed into a developed country, when there is corruption everywhere?” This question greatly upset the many faces of the experienced generation. I said that, “the question was beautiful and I must answer”. Fortunately, the boy’s parents and teachers were sitting by his side. I asked both, “Do you have an answer?” They said, “Mr. President, he shouldn’t have asked such a question, which is beyond his age. Please ignore it, sir”. How can I ignore such a valuable mind? I must answer. My answer was the following.

We can create any number of laws in the country. No law can remove corruption fully. However there are only three members of the society, who can remove corruption. I call it as a “Three dimensional action” plan. Who are these three members? They are father, mother and elementary school teacher. In this connection, I would like to recall a famous statement from Vedic Guru, who said “You give me a child for seven years – after that, no God or devil can change the child”. That is the power of the teacher.

My dear young friends, when you hear my national broadcast, please ask yourself a question, what can be the greatest contribution that the youth can give without disturbing their academic pursuit.

You have to commence a silent revolution for removal of corruption by rightly reforming those who go against righteousness in your families. You all must endeavour to make the home you live, beautiful and righteous. You definitely have the power on your parents to do so, with love and affection.

Now I would like to administer an oath for the youth which I would like the youths to repeat with me now, wherever you are. Are you ready?

1. I will pursue my education or the work with dedication and I will excel in it.
2. From now onwards, I will teach at least 10 persons to read and write, i.e. those who cannot read and write.
3. I will plant at least 10 saplings and shall ensure their growth through constant care.
4. I will visit rural and urban areas and permanently wean away at least 5 persons from addiction and gambling.
5. I will constantly endeavour to remove the pain of my suffering brethren.
6. I will not support any religious, caste or language differentiation.
7. I will be honest and will endeavour to make a corruption-free society.
8. I will work for becoming an enlightened citizen and make my family righteous.
9. I will always be a friend of the mentally and physically challenged and will work hard to make them feel normal, like the rest of us.
10. I will proudly celebrate the success of my country and my people.

India is very fortunate to have 540 million youth out of a billion people. We are doing well in agriculture, our industry is on the upswing and our performance in the services sector is also equally good. Time

has now come for us to make our country, righteous. Righteousness comes out of good character. The evolution of good character leads to harmony in home. Harmony in home brings the people of the state to become enlightened citizens. Enlightened citizens lead the planet earth to be a peaceful world.

Let us rededicate ourselves on this occasion of the 55th Republic Day to work towards making India a prosperous, happy and secure nation, with smile on billion faces.

Voting – A Sacred Mission

YOU MIGHT RECALL during my address to the nation on the eve of 55th Republic day 2004, I had appealed to you that all eligible voters must exercise their franchise without fear. As you are aware, India, the largest democracy in the world is going to elect the members of her 14th Lok Sabha and members of Legislative Assembly in four states. It is a great opportunity provided to you to elect the members who will be guiding the destiny of the nation for the next five years. The right to vote is a sacred right and an onerous responsibility that you owe to the motherland. Hence, exercising your franchise must become a priority activity for you and you should go for casting your vote positively.

By casting your vote to a candidate who in your opinion can represent you in the Lok Sabha, you are sowing the seeds for creating a prosperous India, a happy India, a safe India, a secure India and above all an India with nobility. May I remind you that by casting your vote you will be fulfilling the aspirations of the children and the youth of our nation and create a powerful system that will make their dreams a reality.

In a democracy one important principle is the equality of every citizen. Time of election is an occasion when this can be demonstrated visibly. This is an opportunity for all of you, who are eligible to vote, to go to the booths and exercise your franchise. Therefore, I would request all the eligible voters both in urban and rural areas to give a pleasant surprise to the nation by going and voting in large numbers with your eligible family members.

I have been assured by the Election Commission that all the polling officers and professionals responsible for conduct of polls will provide

easy-to-follow clarifications and guidance to the voters for their doubts, help them with a smile in exercising their franchise and be people-friendly.

Dawn of beautiful India is in your mind and then in your deeds. The deed for the day of the election for you is to cast your vote and be a proud contributor to the success of the spirit of democracy of the largest and dynamic democracy of all democracies.

I appeal to all of you to go ahead and exercise your fundamental right to vote.

Education for Dignity of Human Life

ON THE EVE OF the 58th Independence Day, I extend to you my best wishes for your happiness and prosperity. My greetings to all of you at home and abroad. Let us, on this occasion, remember with gratitude the selfless and devoted services of our Armed Forces and those of the Paramilitary Forces, who are guarding our frontiers on the land, the sea, and in the air. I take this opportunity on this Independence Day to convey the best wishes of the people of India, to our men and women participating in the Olympic Games in Athens.

I met 200 freedom fighters from different parts of the country on 9th August 2004. I saw in their ripe age, their enthusiasm to bring back the nationalism as a living movement. I salute all our freedom fighters on this occasion. Let me dedicate this Independence Day broadcast to those great souls who pioneered our Independence movement. We remember them with reverence and gratitude for liberating us from centuries of foreign rule. Their saga of sacrifice has realized the singular and the noble vision of heralding an independent nation.

We must realize the significance and the value of our freedom movement. Fortunately after our independence in 1947, we have come a long way in the field of education and moved towards a knowledge society, as a result of the vision of our educationalists and the policies and actions of successive governments. Many of our educational institutions have excelled in the world. In order to revitalize our self-esteem and culture, it is vital to emphasize the role of education system for creating an enlightened, dynamic and prosperous society utilizing the advancement of science and technology. I therefore propose to

discuss the education system in some detail in the later part of my address.

The nation is happy that the conduct of the recent general elections and transition to a new government has taken place in a peaceful and orderly manner. In an increasingly complex world environment, this significant achievement emerging from India is yet another valuable contribution to world peace and stability. Now that the government is in place, we all have to get on with the work of building the nation.

We are steadily strengthening our presence in Regional and International institutions including the United Nations. We also realize it is essential to strengthen and restructure the United Nations to make it more purposeful. We cherish and advocate multi-polarity in the world order that respects the principles of sovereignty, non-intervention, freedom and democracy. While not forgetting the painful lessons of history, our foreign policy is aimed at a vision that seeks to establish India, the largest democracy in the world, as a developed country with its rightful place in the international fora.

With the rapidly changing global security environment, our nation's domains of security concerns have greatly expanded from what it was after Independence. Another measure of our nation's strength is the effective, firm and fair handling of a series of internal low intensity conflicts and the proxy war. I note with satisfaction our continuing efforts towards good neighbourly relations, particularly the sustained progress of the peace process between India and Pakistan.

Our economy has yielded a growth rate of Gross Domestic Product by over 8%, driven by broad-based accelerated growth in agriculture, infrastructure, manufacture and service. Sustaining our growth, containing annual inflation rate, containing revenue deficit through prudent revenue enhancement and expenditure management are the other challenges for Centre and the States. The root cause of poverty lies in illiteracy, unemployment and lack of basic health care and there is a need to sharply increase public spending in these areas.

Certain regions in the country like Bihar and Assam are constantly affected by floods every year, and we are witnessing that even now.

There is a need to find a long-term solution to control floods and store and utilize the surplus water for usage during dry season and also the linking of regional river basins. In the Gangetic plain and in the north-eastern region, I would recommend construction of layered wells in the entry points of Kosi river flowing from Nepal and Brahmaputra flowing from Tibet. These layered wells will store the floodwater at different levels and will control the intensity of damage in low-lying areas by reducing velocity of flow. In addition we may consider the possibility of underground water storage systems at river basin sites and also other places. The water thus stored will be useful at the time of need. Water mission has been rightly identified as a priority area by my government.

Our employment generation system has not kept pace with the inflow of educated youth. A three-pronged strategy is needed to make education more attractive and simultaneously create employment potential – how do we do that? Firstly, the educational system should highlight the importance of entrepreneurship and prepare the students right from the college education to get oriented towards setting up of enterprises. Diversity of skills and perseverance in work makes an entrepreneur. In addition, college syllabi even for arts, science, and commerce courses should include topics and practicals where such entrepreneurship is possible. Secondly, the banking system should provide venture capital right from every village level to the prospective entrepreneurs for undertaking new enterprises. Banks have to be proactive to support the innovative products for enabling wealth generation by young entrepreneurs by setting aside the “conventional tangible asset syndrome”. Thirdly, there has to be an economic pull for generation of marketable products and enhancement of purchasing power among the people. This can come through by implementation of mega programmes such as rural connectivity, regional linking of rivers, infrastructural missions, power missions and tourism.

We need the education system to focus on high value and productive employment opportunities. The recent study indicates that the unemployment level in the country is 9% of 400 million employable people. That is around 36 million. We can definitely find productive employment for all the 36 million people by launching certain missions

like bio-diesel generation through plants such as Jatropha, dry land and herbal farming in the available 33 million hectares of waste land earmarked for cultivation.

Education is the most important element for growth and prosperity of a nation. India is in the process of transforming itself into a developed nation by 2020. Yet we have 350 million people who need literacy and many more who have to acquire employable skills to suit the emerging modern India and the globe. Children who belong to weaker sections of our society are undernourished, and only a small percentage of them manage to complete 8 years of satisfactory education. We need to think specifically for them. Education is indeed a fundamental right of every Indian child. Can we allow the situation to continue in which millions of these children are forced into lifelong poverty? The requirement is that the parents should be able to go to any school nearby and admit their children and happily come back home with the confidence that their children will get a good and value-based quality education in that school. The conditions of differently-abled children require equally important attention. In view of such critical issues and their importance, and also to break out of our historical mindset, an effective and self-renewing education system is therefore fundamental to the survival and growth of civilizations, therefore I now propose to address the issues pertaining to education in some detail and suggest some solutions, which can be considered for implementation.

Let me share with you one important concern: unequal access to educational resources still exists due to a variety of reasons. For example, I have seen in our villages three types of families. The fortunate ones who realize the importance of educating the young ones at any cost, guide them at all critical stages due to their economical well-being. There are those families, who might realize the importance of education, but are not aware of the opportunities in time, nor the procedures and ways to realize these opportunities for their children. There is a third category of families who are economically weak and do not realize the value of education and hence for generations together their children are neglected and continue to live in poverty.

It is essential that we enlighten and create widespread awareness of education among all sections of society particularly in rural areas and among urban poor. We should use technology for this important social purpose. It is possible for NGOs, other social and philanthropic institutions and media to focus on this area of creating awareness. We should also mobilize necessary resources for providing education to the underprivileged people. Let us elaborate the way ahead.

Over the last 50 years, successive Governments have been committed to achieving the national goal of universal education and has steadily increased the budgetary allocation for education. However, 35% of our adult populations are yet to achieve literacy. The expenditure on education as a percentage of our gross domestic product has a direct impact on our literacy. Today our expenditure on education in India is little more than 4% of our GDP. If we have to achieve nearly 100% literacy, it is necessary to increase its expenditure on education to about 6 to 7% of the GDP. This 2 to 3% increase has to be sustained only for a few years. Thereafter, a lower percentage of GDP allocation to education will be adequate to sustain the high degree of literacy in this country for all time to come.

Clearly public expenditure alone from Governments in the Centre and States might not be able to meet the challenge of mobilizing an additional 2 to 3% of GDP for the mission of education. It is here that we have to generate additional resources for this noble mission. Expenditure on education, whether in the Centre or in the States can no longer be provided only by the respective Ministries or Departments for human resource development. Indeed, every department of Government must play a significant role as a partner of the human resource development organization, and contribute resources in terms of budget and infrastructure for implementing the mission of providing quality education to the whole nation.

To augment the Government resources, I appeal to the entire corporate sector to emulate the example set by some corporate leaders who have focused on education to make a national difference. Different regions of the country may be adopted by the corporate sectors within an overall national mission for education. The mechanism should enable the persons to have freedom to innovate and deliver directly.

The preferred school concept is arising because of differential quality and standards of teaching. There is a need to make the quality of teaching high in all schools. Also there is a need for preparatory education even in rural areas to make the child competitive when he or she joins the regular school. For running such schools in rural areas NGOs and corporate sectors can play a vital role. Also rich parents who can afford can adopt certain number of rural children for educating in preparatory schools.

I would like to recall a question asked by Master Kuldeep Yadav, Class X, of Etawah during my visit to Saifai. He asked me:

“Villages are also full of talents but facilities are available in the towns/cities only. Have you planned something for these children so that they can get good education in the villages?”

I was glad to see a child’s concern for his rural counterparts. We need to address this problem, which has multiple dimensions. It tells about the non-availability of infrastructural facilities in schools, the problem of syllabi followed in the school and the non-availability of quality teachers.

Job opportunities being national, the syllabus should be structured in such a manner that it should meet the changing societal needs, fulfill the needs of the occupation and inculcate high moral values among the students in addition to learning skills. The delivery of quality education is possible only through quality teachers. The teacher has to be a committed teacher who loves teaching and children. And also the teacher has to be equipped with all the knowledge required for effective teaching. The self-esteem of the teacher must be high and the teacher must have the quality to become a role model for the children. Some element of competitive rewarding is to be done based on performance. This competency has to be built up throughout the country through a massive teachers education programme delivered through a tele-education system and continuously updated. This can be funded and implemented by a consortium of Government, educational institutions with the corporate sectors providing value added services.

There is an urgent need that every school should have basic amenities such as good building equipped with ventilated, lighted, airy and spacious class rooms besides library, laboratories including the latest IT tools and infrastructure, safe drinking water, clean toilets, play ground, etc. This is possible by earmarking the additional 2 to 3% of GDP.

Parents have an important role in the education of the children and making them enlightened citizens. They must be aware of the need for good education of the child, male or female. Like teachers, parents also should set an example for the child in their overall behaviour and conduct. This will enable the child to develop love and respect for their parents and see them as role models.

It is reported that 39% of children drop out from school after studying 5th class and 55% drop out after studying up to 8th class. This situation needs remedial action, especially since assent has been accorded for the 86th Constitution Amendment Act – Right to Education Bill for children between the age group of 5 and 14 years. But an Act alone cannot achieve the goal unless the education is delivered in a manner, which will take into account the socio-economic reality, and perception of people to whom it is addressed. Apart from attracting children to schools, the education system should be able to provide nourishment and inject creativity among the children. Also the aim of the education system should be to build character, human values, enhance the learning capacity through technology and build the confidence among children to face the future.

I have seen an education model implemented in Karnataka, which provides an accelerated learning using the computer aids so that children can have a creative learning with the tools of creative animation through computers. Dropouts are identified and brought to the school. This holistic phenomenon of learning once ingrained in the primary stage where there is a happy learning process and a non-threatening evaluation, has led to voluntary learning by the participants.

Recently, I have received many e-mails from children and parents regarding too many entrance examinations which the children have to take from nursery up to plus-two level for entry into schools, colleges,

universities and professional courses. This I consider as a heavy burden on the children. Also, it has led to proliferation of tuitions and coaching institutes for preparing the students for entrance examinations. For entry into universities and professional colleges, we have to devise a common all India examination to be conducted by a nominated institution of Government. Also, the examination must be so designed that attending a coaching course does not provide undue advantage to privileged students. Entrance test should be more in the nature of aptitude assessment rather than creating a seniority list.

I find there is a demand for more transparent and reliable system of examination, evaluation and reporting. It is also noticed that the examination primarily tests the memory of the students. I remember during my study in MIT, Chennai in mid 1950s, they used to conduct open book examination. This used to be one of the tough examinations for the students. I would recommend that the examining bodies may consider introduction of open book system of examination. This will promote creativity among the teachers in setting questions and the evaluation of the creative ability of the students. A secure examination system is the need of the hour.

The examining bodies should have a reliable evaluation system and timely declaration of results. After the initial evaluation of the answer paper a centralized core group can draw random samples from each batch and carry out independent evaluation. If there is no discrepancy between the initial evaluation and the core group evaluation, and it is consistent with the performance of the students, it will be presumed that the batch marking is satisfactory. In case of a discrepancy further samples should be drawn for verification. Special training must be carried out by examining bodies for certifying the examiners in the evaluation process. In short the examining bodies must evolve very good procedures and then get ISO Certification for their evaluation system.

The recent tragedy involving school children at Kumbakonam must have rung some bells in all the educational institutions in the country. It is the responsibility of sponsoring organization to see that

their schools maintain basic minimum norms both in the academic field as well as in the physical facilities which they provide on their campuses. Certain safety features must be built in our school buildings without which it should not be possible to get affiliation by these schools. And there should not be any discretion available with anyone, to waive off these conditions. Honesty in implementation is vital at all levels.

Constraints of time and space together with the rapid obsolescence of knowledge in some areas of science and technology, have created a huge demand for different courses from different institutions in the distance mode. There is a need for a working digital library system that alone can, in the long run, provide the kind of access required for a Knowledge Society. Technology Enhanced Learning is a solution. It attempts to exploit the rapid developments in Information and Communication Technology. As the communications bandwidth continues to increase and the cost of computer power continues to drop, Technology Enhanced Learning will become an economically viable solution. Virtual classrooms of the future will have students from many locations taught by a team of geographically distributed Instructors through tele-education delivery system.

Ultimately, education in its real sense is the pursuit of truth. It is an endless journey through knowledge and enlightenment. Such a journey opens up new vistas of development of humanism where there is no scope nor room for pettiness, disharmony, jealousy, hatred or enmity. It transforms a human being into a wholesome whole, a noble soul and an asset to the universe. Universal brotherhood in its true sense becomes the sheet anchor for such education. Real education enhances the dignity of a human being and increases his or her self-respect. If only the real sense of education could be realized by each individual, and carried forward in every field of human activity the world will be so much a better place to live in.

Mission of education by Government at Centre or States or the combination is the foundation to ensure the creation of enlightened citizens who will make a prosperous, happy and strong nation.

Strength of India-Post lies in its People

I AM INDEED delighted to inaugurate the Sesquicentennial Celebrations of India-Post. My greetings to the organizers, government functionaries, all members of the Department of Post including all the Post Office Personnel and their families working in far flung areas of the country during this historic occasion. Post Office is the only institution in the country which touches every person's life. This is demonstrated by the fact that whenever government or non-government agencies attempt to reach the largest number of people they think of the Post Office. I would like to congratulate the pioneering spirit, resilience and the glorious traditions of providing quality service of this Department, which is now 150 years old, to the common man in all parts of the country. If we have to recreate this organization today, it will cost over Rs.50,000 crores. I note the accumulated savings deposits today amount to over Rs. 3,25,000, which is almost equivalent to the deposit of a leading nationalized bank in India.

There has been considerable technological change in the communication system in the 20th century. With the introduction of fax, e-mail, Internet, video conferencing, tele-education, tele-medicine, the concept of communication has considerably changed. Now the information-communication is moving electronically from one end to the other, and the need for physical movement of information is gradually coming down and is being restricted to physical commodities like parcels, gifts, etc. With these changes, there is a need for creating a new vision for the vibrant post office system.

The strength of India-Post lies in its people. Post Office is an institution. Postmen have knowledge of the village and they have a lasting relationship with the people. The core strength of the Post

Office lies in its connectivity to each and every village and the personal knowledge of the postman of every house in the village. I still distinctly remember the “runner” who were the pioneers in giving this connectivity to the rural and remote areas. In the new environment where there is an urgent need to develop our rural sector the Post Office system can become a partner in rural development since there are possibilities of new connectivities. Towards this end, I would like to make the following suggestions.

We have developed a rural development model, which is based on providing connectivities such as physical, electronic and knowledge connectivity. Electronic connectivity to the groups of villages through broadband, satellite and wireless for last mile connectivity would lead to knowledge connectivity through tele-education and tele-medicine. Also, as you are aware EDUSAT has been launched on 20th September 2004 which will enhance the education network for schools via tele-education network connected to educational institutions and universities. In addition, the land and wireless connections now available all over India can be integrated to provide various forms of connectivities as required for the rural area. The major focus of PURA—Providing Urban amenities in Rural Areas—would be on entrepreneurship, sustainable employment, economic growth and marketing (local vs. global). To begin with, in the entire country we propose to have nearly 7000 PURAs. At present there are 1,30,000 post offices in the rural areas out of a total of 1,56,000 post offices in the country. This means we can have nearly 19 post offices per PURA. These Post Offices located in the PURA complex can be identified as a hub for the provision of electronic connectivity and knowledge connectivity to the village community leading to economic connectivity of the village clusters. Post offices at various levels of operations can be the partner in rural development, since the post offices are already linked to the people.

The rural economy can be enhanced if we can provide knowledge inputs at the right time to the farmers, artisans, craftsmen, small-scale industries, self-help groups and entrepreneurs through these connected post offices. The rural people will need information on the state-of-the-art technology relevant to their area/region for getting

better yield from their land at reduced cost of farming. They will also like to know about the arrival of the monsoon and the action to be taken in case of monsoon delays. Through mobile tele-education networks, the equipped post offices can reach the rural people and provide them information on the farm mix suitable for their land and also methods of multi-cropping and use of organic manure and pesticides. This will enable the farmers to understand the problem better and implement the solution in their fields. The students in the villages would like to have information on various courses of study in ITI, diploma education centres, vocational training centres, colleges and also about the types of skills which have greater employment potentials so that they can acquire right types of skills. They also would like to know about the employment opportunities and entrepreneurial opportunities within the PURA complex and other PURA complexes located in the Districts or States. The village community would like to know about the availability of clinics and tele-medicine links to District and Corporate Hospitals so that they can get the right type of health care support in times of emergencies. They also need information on the doctors and clinics where vaccination and immunization support is available for the children. Information regarding the availability of the skill set in the village and products and services available from the small scale industries in the village complex would be useful for neighbouring PURAs and also distant PURAs where there is shortage of such skills.

I understand that the Post Office has diversified the postal operations into different areas through their business development programmes. They have created new products and services such as speed post, speed post passport service, media post, data post, e-bill post, e-post etc. which are definitely useful services to the common man and the business community. In addition, the post office is diversifying into financial services such as international money transfer service, distribution of mutual funds and bonds, electronic funds transfer, warrant payment, collection of telephone bills, etc.

There are a number of departments which are collecting Contributory Provident Fund from their employees. The growth of this task has been phenomenal and many departments are finding it

difficult to keep track of the contributions made by the employees, adjustment of interest and provision of financial status to the employees. This task can be very easily outsourced to the Department of Post since they have gained adequate competence by maintaining the Post Office Saving Account for lakhs of individuals.

I am happy to note that the Department is constantly building the capacity of the Post Office to enable it to diversify the range and quality of the marketing and financial services. On the insurance front, the Postal Department is planning to offer new products such as Group Premium Policy, Pension Schemes and Term Policy. In addition, for persons in rural areas who have only studied upto 8th standard or 10th standard but have right marketable skills, the post offices can also be used for micro-credit facilities so that they can become entrepreneurs.

Another major role for post offices is to prepare our citizens for meeting the global challenges, coming out of globalization of economies, and help in the process of knowledge servicing. Post Offices can also contribute effectively in the operation of Village Knowledge Centres which are proposed to be created in each of the Panchayats in the country.

India has approximately 2.3 lakhs Village Panchayats. I visualize establishment of village knowledge centres in these Panchayats to empower the villagers with the knowledge and to act as a nodal centre for knowledge connectivity for the villagers. Initially 100 remote Panchayats may be chosen for the Model Pilot project. Based on this experience, it will be possible to replicate Village Knowledge Centres in other Panchayats.

This Centre will be equipped with 1000 books on different subjects. In addition, it will have a computer terminal, telephone connections, modem, printer, photocopier, camera, scanner, internet connection and other support facilities for functioning as a digital library. The knowledge centre will provide hard copies of relevant pages to the members of the village, if required. Also the centre can have facility for reading the text with an audio output so that people who are unable to read, can benefit from the library. The knowledge centre can also

be used for collection, digital storage and dissemination of village-specific information pertaining to agriculture, craftsmanship, arts, artisanal techniques, informal judicial system practised in village based on values, local remedies for simple ailments, village stories with moral values, village history, village folk songs, village cultural traditions, traditional medicinal practices followed in villages and village marketing information and methods. Such information presently is being transmitted through word of mouth and with changing generation, it is being lost. The postal personnel and the teams which will closely work with them can be deployed in the knowledge management centre on part-time basis, which will not only enrich their contribution to the society but also provide cost-effective digital library and information services to the village community.

The village revenue authorities are presently maintaining the land records manually and they collect the land tax from the landlords on half yearly and yearly basis. Generally there is a delay in the change of ownership in the land records leading to many disputes. The Post Office can help the revenue authorities in computerizing all the land records in the villages and also they can arrange billing to the landlords on yearly or half yearly basis. Such computerized billing will enable the landowners to pay the dues in time and also raise objections if there are any discrepancies in the ownership data recorded in the land records. This procedure, in addition to making the system of collection fool proof, will reduce the possibility of disputes in land ownership, which is a source of perennial problem in our villages. Post Office can be paid an appropriate fee by the land record authorities for providing this service.

In addition, the Mapping of Neighbourhood project successfully executed by the Department of Science and Technology at Almora District with the voluntary participation of school children can be expanded in a major way by using post offices as focal points. However, it should be executed imaginatively with flexibility because any bureaucratic or hierarchical interference is not conducive to unleashing the creativity of children.

What is today in place is a physical network of Post Offices. To match the vision stated above, we have to put together an electronic network which will interconnect the entire postal network. It is today possible with the emergence of new communication technologies like broadband, CDMA, WLL, and FDMA etc. along with enormous governments/private initiatives in the form of making the bandwidth available throughout the country. To start with, right up to the village sub-post office level, a computerized network can be put together with a central server technology of appropriate nature. The village/branch post offices can also be linked to them either through the computer network or to start with through a communication link by way of landline or mobile telephone which can be even web-enabled. This will straight away give the rural post offices ability to communicate with the urban centres, both ways, and provide a network which can facilitate the knowledge connectivity. Over a period, through the concerted efforts of all the stakeholders it is possible to create contents of appropriate nature right from agricultural practices to monsoon prediction, local medical knowledge to the advanced medical counselling centres etc. That all these things can be done for a fee can make the postal network also viable. Mere technological additions may not make the envisaged system effective; what is called for is large-scale training and motivation of the Post Office personnel at all levels and particularly at the cutting edge in the village level, to be an empowered entrepreneur rather than a mere paid employee. Suitable linkages with the banking sector can ensure the rural youth and the unemployed to get financial support in the form of credit, which will enable them to expand their business horizon, provide in-depth connectivity and thereby become owners of viable postal entities. Thus, it is a win-win proposition for the India-Post and its employees as well as to the millions of villagers and particularly the youth. A sense of urgency is required in implementing the programme of this nature which is in perfect consonance with the national development goal and harmony with the planned growth.

The strength of India-Post is threesome, viz. the trust of the people in the institution, its network and the human resources. This is a user-friendly organization in the country and they have earned this friendliness

through delivery of information and money order to the clients. They help in providing connectivity of hearts. By nature, it is an expanding and outgoing organization. These strengths should be leveraged and a growing system should be developed which will serve the national development cause while optimizing technologically the power of the post offices by becoming a partner in rural development. The completion of 150 years by India-Post brings it face to face with opportunities as well as threats — the opportunities due to the newly emerging technologies and the threats due to the competitive forces. The post office in collaboration with institutions like NABARD can become a main source for disbursing rural credit at economical interest rates which appears to be the crying need of the hour for our rural population. A living organization thrives by converting every threat into an opportunity and I am sure that the India-Post can rise up to the occasion and make substantial contribution towards transforming India into a developed nation.

I would like to share with you my visualization of the postal systems of the new millennium. The post office personnel can be empowered with a mobile telephone, a personal digital assistant (PDA) and the capacity to mobilize rural postal life insurance. This will enable him to provide service to the remote rural dweller who needs to communicate for multiple purposes. The information stored in the PDA will enable him to give to the villagers the information needed for agriculture, craftsmanship, marketing, education, health care etc. to make meaningful use of inputs and outputs for promoting vibrancy in the rural economic system. The promotion of postal life insurance will bring social security at the doorstep of the villagers. All these things put together even call for a renaming of the trained post office personnel in a village as a “Rural Facilitator” or “Rural Knowledge Officer” and those in cities as “Knowledge Service Providers”.

The newly value-added services like savings banks, social security measures like rural life insurance should be dovetailed into this electronic and knowledge network so that resource mobilization, credit availability and investment assurance will become available to the rural and the middle class families who at present very often go through many agencies. The stepping-in of India-Post into the infrastructural and

developmental process should become the theme for the resurgent India-Post of the 21st century.

I would recommend the following six missions for India-Post for the new millennium:

- (a) Transforming the post-man or post-woman to play a dual role of being the friend of the family and also information officer for empowering the villages. He or she will act as an interface between technology centre, knowledge and information base and the villagers.
- (b) Preparing the system of India-Post to provide an empowered network for promoting rural development.
- (c) Creating a networked infrastructure of all the post offices in the country through computers and tele-communications.
- (d) Establishing village knowledge centres with data base required for the rural development (agriculture, infrastructure, education, employment, health care, land records etc.) in collaboration with the relevant agencies.
- (e) Training the human resources to undertake envisaged activities.
- (f) Empowering the post office personnel in a village to be re-designated as “rural knowledge officer” with mobile telephone, PDA and other requisite facilities.

My best wishes to all members of India-Post for success in their mission.

Innovation and its Dimensions

I AM INDEED delighted to participate in the 3rd National Award Function of the National Innovation Foundation. I greet the award winners, innovators, collaborators and the organizers and the National Innovation Foundation (NIF). The objective of NIF to help India become an innovative and creative society and a global leader in sustainable technologies by scouting, spawning and sustaining grassroots innovations, is indeed a laudable effort. Grassroots does not mean living with old unproductive small time mindsets—cobbler as a cobbler, fishermen in the same old boat with a few nuts changed—but to move fast towards knowledge society.

I was studying the Global Competitiveness Report for the year 2003-04. There I find in terms of Innovative Capacity Index, US is ranked one, Singapore 6, South Africa 27, China 40, Brazil 42 and India 44. In the same report I noticed that the proportion of Scientists and Engineers Index is stated as US 4, Singapore 6, South Africa 38, China 43, Brazil 51 and India 60. Thus, we can see the large proportion of new ideas and innovations generated in the universities in USA. This innovation arises from private sector initiative and the R & D productivity of the firm, shaped by local policies and nature of local institutions. National innovative capacity has to be the country's important potential to reinforce both political and economic entity with commercially relevant competitive products. This capacity is distinct from purely scientific or technical achievements and focuses on the economic application of new technology. Thus, for building innovative capacity, we require the partnership of private sector, public sector, R & D and academia as a group. I would recommend the Hyderabad University to work towards building the innovative capacity amongst its faculty and impart knowledge to students.

To achieve a goal what is needed is not only knowledge, but also a passion. The passion should not be limited to the technical aspects but it should also aim towards creating a concern for the society with a view to finding positive solutions to the problems.

In the present-day world when the corpus of known knowledge is multi-disciplinary and products and services are complex it is often not possible to have a loner as an innovator. Most of the discoveries and innovations are team efforts. Education system should work towards team building among the students. Every student must have an opportunity to play the role of a team member and a team leader so that he can see both sides of the fence. The amount of information that we have around us is overwhelming. The management of knowledge therefore must move out of the realm of the individual and shift into the realm of the networked groups. The students must learn how to manage knowledge collectively. When the information is networked the power and utility of the information grows as squared as predicted by Metcalfe's law. Information that is static does not grow. In the new digital economy, information that is circulated creates innovation and contributes to national wealth. In this context, let us discuss the national scenario and its priorities.

The creativity is indeed the result of the education process and the environment of the school and above all the teachers' capability in igniting the minds of the students. The essence of it can be seen in the following verse:

Learning gives creativity,
Creativity leads to thinking,
Thinking provides knowledge,
Knowledge makes you great.

I would like to share with this audience, information about the six young innovators from various schools of our country whom I met at Rashtrapati Bhavan on 2nd September 2004.

Their innovations were:- a system to prevent the soiling of railway tracks by Madhav Pathak of Jabalpur, Madhya Pradesh; herbal pesticide

tablets for storage of food grains by Priyanka Guleria of Sionty Village in Punjab; low calorie biscuits made from banana peels by Rucha Joshi of Nanded, Maharashtra; a toy laser for educational applications by Sudhanwa Hukkeri of Belgaum, Karnataka; a software programme for embedding of text through audio signals by Kyan Pardiwalla of Mumbai, Maharashtra; and an optically-controlled wheelchair by S. Harish Chandra of Chennai, Tamil Nadu.

The group was chosen following a rigorous selection process and the innovations had the largest number of footfalls at the Tokyo Exhibition. The process of selection and sending the group abroad was co-ordinated by Confederation of Indian Industries (CII) and the Department of Science and Technology (DST).

Since our population is of a billion people, the society in its own way has to make innovations continuously, not only in urban areas but also in rural areas. For example, the honey bee network movement is an excellent attempt. Creativity comes from beautiful minds. It can be anywhere and in any part of the country. It may start from a fisherman hamlet or a farmer's household or a dairy farm or cattle breeding centre or it emanates from class rooms or labs or industries or R&D centres. Creativity has got multi-dimensions like inventions, discoveries and innovations. Creativity has got an ability to imagine or invent something new by combining, changing or re-applying existing ideas. Creativity has an attitude to accept change and newness, a willingness to play with ideas and possibilities, a flexibility of outlook, the habit of enjoying the good, while looking for ways to improve it. Creativity has a process to work hard and continually to improve ideas and solutions by making gradual alterations and refinements to their works. The important aspect of creativity is: seeing the same thing as everybody else, but thinking of something different.

Innovation is market-driven. Innovation can also be making improved performance of the product/system technique by adopting a change using most alternative technologies. An innovative product makes a leap in the benefits-to-costs ratio in some area of endeavour. Innovation is a systematic, organized, rational work—usually done in many stages like analysis, tests, experiment etc. I would like to

give a few examples of innovative technologies/applications. What we see in optical communications is speed vs cost. In flexible manufacturing systems it is choice vs cost. In the web-enabled processes, it is customer satisfaction vs cost. Again in e-Mail, a message is instantly delivered in any part of the world through internet.

It is through the process of innovation that knowledge is converted into wealth and social good. Further, innovation is an important factor for the competitiveness of both service and manufacturing sectors. Innovation tends to emanate less from R&D and more from other sources, including organizational change. Hence there is an urgent need to establish an efficient innovation system in the country. Such a system would involve creation of clusters, which are networks of inter-dependent firms, knowledge-producing institutions (universities, colleges/institutes, research institutes, technology-providing firms), bridging institutions (e.g. think tanks, providers of technical or consultancy services) and customers linked in a value-addition-creating production chain. The concept of clusters goes beyond that of a firm network, as it captures all forms of knowledge sharing and exchange. Thus an innovative system with its clusters would tap into the growing stock of global knowledge, assimilate and adapt it to local needs and finally create new knowledge and technology.

The National Innovation Foundation is able to attract a number of innovations coming from the rural sector. However, what they need is design input to make it into a competitive marketable product. I would recommend a collaborative venture between the National Institute of Design and National Innovation Foundation to work on converting the promising innovations into a commercially viable venture. This can lead to creation of a number of enterprises in the rural sector leading to large scale employment opportunity and wealth generation in the rural areas. The establishment of enterprises for such ventures can be financially supported by the Technology Development Board which is part of the Department of Science and Technology.

Innovation at the rural area: Search and locate any ambient innovation competencies, recognize promising innovations and assist through Self Help Groups. As a next stage, systematic design of the

innovation can be supported by institutions like NID transforming it into a business proposition. At this stage banks should provide venture capital. Once the production stabilizes in small scale it can be extended to large commercial production through the assistance of Technology Development Board. These enterprises should preferably be located in the rural sector where the raw material and the inputs will be available. Also there is a need to train the local youth for undertaking the production and marketing operation. My best wishes to all members of the National Innovation Foundation and rural innovators for their productive contribution in the mission of rural development.

Action Plan for Employment Generation

छप्पनवें गणतंत्र दिवस के अवसर पर आप सबको मेरी बधाई और शुभकामनाएं। आज, मैं अपने संदेश में आर्थिक विकास के लिए आवश्यक रोजगार उत्पादन विषय पर विस्तार से चर्चा करूंगा।

हमें भारत को एक ज्ञानवान समाज बनाना है। भारत में 54 करोड़ युवा जनसंख्या है। पढ़ाई के साथ-साथ हमें उन्हें आर्थिक सुरक्षा भी देनी होगी। ज्ञानवान और आर्थिक रूप से सम्पन्न युवा ही भारत को समृद्ध, खुशहाल, सुरक्षित तथा विकसित समाज दे सकता है।

हमें अपने विशाल मानव संसाधनों का पूरा उपयोग कर विकसित भारत के लक्ष्य को पाना होगा। इसके लिए हमें एक मजबूत कार्य योजना बनाकर उस पर पूरी ईमानदारी और निष्ठा से अमल करना होगा, तभी वर्ष 2020 तक विकसित देश बन सकेगा।

मुझे पूरा विश्वास है कि जैसे सुनामी आपदा का सारे देश ने मिल कर मुकाबला किया, वैसे ही एक विकसित भारत के लिए आप सब मिलकर प्रयास करेंगे। आप सब जानते हैं मेहनत और ईमानदार कोशिश हमेशा सफलता दिलाती है।

अब मैं अपनी बात अंग्रेजी में कहूंगा।

“Everyone has inside of him or her, a piece of good news. The good news is that you don’t know how great you can be!”

ON THE EVE OF the 56th Republic Day of India, my greetings to all of you, including those living abroad. I convey my special greetings to the members of our armed forces and the paramilitary forces, who guard our frontiers on the land, the sea and the air, and also the internal security forces. While we are saddened by the wrath of the Tsunami waves, we are not disheartened. The Central and State Governments, with utmost seriousness and sincerity have reached out to those who needed help and are in the process of providing relief that will at least partially wipe out the pains caused by the Tsunami. During this period of active relief operations, my heart was with you, but I did not make a visit because the members of the Govt. and Non-Government organisations were deployed in large numbers in the relief operations, which were in full swing. Reviews were taken by our Prime Minister, Governors, the Chief Ministers of the respective states and Lt. Governor of Andaman & Nicobar Islands. Now, I feel that the time has come for me to join you, my fellow citizens, to study the process of the reconstruction of homes, and bringing back normalcy.

I met more than 6,00,000 children from all parts of our country, after becoming the President. During my interaction with them, they posed a series of questions, with affection. They asked:

“Mr. President, you saw us smile, when we were five years old. We smiled because we were blossoming innocently. When we came to our teens, smiles slowly faded away and the signs of concern appeared. You said that it is because of our anxiety about our future. This anxiety almost took away our smiles. When we complete our education, the topmost questions in our mind were, what would I do after my education? Will I get an employment? Our parents, who have spent all their savings on our education, also share the same concern. Mr. President, will I get a proper employment and be able to contribute to India, to make it a Developed Nation?” Their questions really made me to think and think.

The concerns about employment are not only for those who are fortunate enough to have school and college education. It is the same fading away of the smiles, the shattering of the dreams and the weaning away of the gleam in the eyes that we see in every cross-section of

the youth in the country. The only answer to retain the smile from the child to the youth is to generate employment. It represents the aspirations and anxiety of nearly 540 million youth of our nation. Hence I have selected the topic for the Republic Day address as “Action plan for employment generation.”

In my earlier address to the Nation on the eve of the 58th Independence Day, I talked to you on “Education for Dignity of Human life”. The whole purpose of education in a country like India is to develop and enhance the potential of our human resource and progressively transform it into a knowledge society. The knowledge society will be a society producing products and services that are rich in both explicit and tacit knowledge, thus creating value-added products. The real capital of this knowledge society will be its knowledge workers. The society will be highly networked to create knowledge-intensive environment along with enabling process to efficiently create, share, use and protect knowledge. Our education system should realign itself at the earliest to meet the needs of the present-day challenges and be fully geared to participate in the societal transformation.

When the world was moving from the industrial to information and knowledge era, we witnessed a changing pattern in the sectoral share of GDP and the number of people employed in each sector. The share of Gross Domestic Product (GDP) percentage has undergone a considerable change. Contribution of agriculture to India’s GDP has reduced from 39% to 22% during the period 1979 to 2004. During the same period contribution of manufacturing sector has moved from 24% to 27% and the contribution from the services sector has increased from 37% to 51%. There has been considerable change in the employment pattern also. The percentage of people employed in agriculture has come down from 64% to 54%. Simultaneously, the percentage of people employed in manufacturing has gone up from 15% to 19% and in the service sector from 20% to 27%. This trend has to continue and by 2020 our employment pattern should aim at 44% in agriculture, 21% in manufacturing and 35% in service sectors. The displacement of 10% people from agriculture sector has to be facilitated through skills enabling undertaking value-added tasks in

the rural enterprises so that migration to urban area is reduced. Instead of the person from the rural areas going to urban towns in search of jobs in manufacturing and services sectors, PURA (Providing Urban Amenities in Rural Areas) facilitates creation of employment in the rural area itself. PURA achieves this by providing physical, electronic and knowledge connectivities to a cluster of villages thereby leading to their economic connectivity and prosperity.

National Rural Employment Guarantee Bill 2004 was tabled in the Parliament in its last session to create employment opportunities in the rural sector. What is needed is a co-ordinated planning and linking the spirit of this Bill to productive and sustainable employment generation scheme to the unemployed youth. Now I would like to discuss the national employment scenario. As per the estimate of the Planning Commission, the total number of people eligible for employment at present is approximately 400 million. Out of this, nine percent are unemployed which works out to around 36 million. In addition, there is a need to find value-added employment for 10% of those employed in the agriculture sector in the rural areas. Our attempt hence should be to find gainful employment for around 76 million people. This will add to our productivity and will ensure a sustained 10% GDP growth for the decade, which is an essential need for India to become a developed country before 2020. A nation of billion people that is capable of exporting food grains, a nation that is recognized for its software products and services, a nation that can build its own aerospace systems and nuclear power plants, a nation that is leading in pharma and automobile industry, I am sure, will be able to put all its think tanks together and come up with many innovative wealth generating schemes for the productive employment of 76 million people.

Let me share with you how to generate employment. The most important sectors for sustainable national development are agriculture, education, health care, water and energy. The common thread that will run across these would be the three connectivities of PURA. One of the ways by which the rural agriculturists could increase their earnings is by value-adding to the agricultural produce by processing and

manufacturing. The farmers, either individually or through their co-operatives would market processed and value-added items instead of marketing the raw materials. This increase in the value-addition taking place in the rural area itself is an indicator of the society moving towards prosperity and knowledge era. I would like to suggest a few schemes that can bring large-scale employment and prosperity to our people.

We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares have been allotted for tree plantation. Certain multi-purpose bio-fuel plants can grow well in wasteland with very minimum input. Once cultivated, the crop has fifty years of life. Fruiting can take place in these plants in two years. Bio-fuel plants grown in parts of the waste land, for example, 11 million hectares, can yield a revenue of approximately Rs.20,000 crore a year and provide employment to over 12 million people both for plantation and running of the extraction plants. It will reduce the foreign exchange outflow paid for importing crude oil, the cost of which is continuously rising in the international market. The bio-fuel is carbon mono-oxide emission free. The oil can also be used for soap and in candle industries. De-oiled cake is a raw material for composting, and the plantation is also good for honey production. We should absorb the best of the technologies available worldwide and start commercial operation immediately. One-time investment needed for bio-fuel plantation to production in 11 million hectares will be approximately Rs.27,000 crore. The capital equipment and investment in plant and machinery can come from bank loans and private sector entrepreneurs. I have seen the progress in bio-fuel plant cultivation, preparation of seedlings, tissue culture and development of non-toxic hybrid varieties in Tamil Nadu Agricultural University, Coimbatore. They have also worked from processing of seeds to bio-fuel production by the indigenous design and development of bio-fuel plants. Anand Agriculture University at Anand (Gujarat) has also made progress in the bio-fuel cultivation and processing in Gujarat. Bio-fuel plants can be grown in a number of states in the southern, western and central parts of the country.

ICRISAT with its international experience of working in arid regions have developed short duration, disease and drought resistant varieties of important crops beneficial to our farmers. They have introduced various tillage practices and nutrition management techniques, to boost crop yields even under drought stress. This technology will enable us to reclaim 5 more million hectares of the 33 million hectare of wasteland allotted for productive farming. As per the experts, this will result in the deployment of 15 million people for the dry land cultivation.

Water harvesting should become mandatory for all. To improve water table, we need to build check dams, develop water sheds, desilt ponds and rivers, clear the inlets and outlets to the ponds and water bodies and recharge the wells. If our rural areas are made to have the operational water bodies, recharging of the wells will take place. The task is totally labour intensive and nationwide implementation of this scheme will provide employment for six million persons for more than three or four years. The scheme will result in increase in storage capacity of water bodies and create additional irrigation potential of the land in the region and enhance agricultural productivity.

This mission envisages an integrated programme of expansion of plantations of bamboo species, the scientific management, and promotion of community level value addition and entrepreneurship. This will enable presenting the raw material for the industries and the industry to access and apply modern technology for producing globally competitive new generation bamboo products. This includes setting up of clusters of small value addition processing units, near the resource for employment generation and benefit to the local small entrepreneur. Processed raw material suitable for ultimate use in industry/handicraft sector will be required, for economizing handling cost of raw material to the location of industry proposed to be set up in different parts of the country. The programme envisages the cultivation of bamboo over two million hectares and promotion of technology and networking for enhancing the trade. The economic and social benefit from these activities will lead to the creation of 8.6 million jobs and the market opportunities worth over Rs.6,500 crore with an investment of Rs.2,600 crore. This will be useful for the

additional development of the north-eastern region. We should use the management personnel, industrial experts and business houses to provide international market connectivity for our bamboo products leading to sustainable growth, wealth generation and positive contribution to the growth of GDP. The institutions like National Institute of Design, Ahmedabad, Indian Institutes of Management, industrial houses, State government and Ministry of Agriculture can work together to generate a number of bamboo enterprises in different rural clusters.

As you are aware, the use of coal for power generation results in increased quantum of fly ash production, which has reached about 100 million tonnes per year. All out efforts are needed to utilize this fly ash not only from environmental considerations, but also to avoid land usage for fly ash dumping. Though there has been a steady progress in fly ash utilization from 1990, we have a long way to go to reach the target of 100% fly ash utilization. It is reported that the agricultural increase of grains is around 15%, green vegetables 35% and root vegetables 50%, when fly ash is mixed with the soil. Toxicity tests have proved that there is no toxic element due to fly ash. But it has higher nutrients due to increased availability of iron and calcium. The fly ash can become a wealth generator by making use of it for producing “green building” materials, road, agriculture etc. Full utilization of the generating stock will provide employment potential for 3,00,000 people and result in a business volume of over Rs.4,000 crore.

Textile industry is very important for the Indian economy. The basic raw material is cotton. India is the third largest producer of cotton in the world. However, compared to the world average of 700 kgs of seed cotton per acre we produce only 350 kg of seed cotton per acre. It is indeed a technological concern for the nation. Some of the industries have adopted a village in Punjab, which has brought out a co-operative movement of the farmers, scientists, trainers and the industry and launched for cultivating cotton in over 1200 acres. A training programme was launched for farmers starting with soil characterization, matching the cottonseed to soil, water and fertilizer management. The project resulted in increasing the average seed cotton

yield of the village from 450 kg per acre to 950 kg per acre. This led to the sevenfold increase in net return per acre, due to considerable reduction in input costs. It is worth noting that in this case the yield is above the world average. This model has already been replicated in ten villages and can be emulated by many cotton-growing regions of the country. India can definitely produce 25% of the total world production of quality cotton compared to the existing 12% leading to revenue of over Rs.25,000 crore a year for the nation. I would like to link cotton production to garment export business, which is a low investment and large volume employment generator. India is presently exporting six billion dollars worth of garments, whereas with the WTO regime in place, we can increase the production and export of garments to 18 to 20 billion dollars within the next five years. This will enable generation of employment in general and in rural areas in particular. By tripling the export of apparels, we can add more than 5 million direct jobs and 7 million indirect jobs in allied sector, primarily in the cultivation of cotton. Concerted effort is needed in cotton research, technology generation, transfer of technology, modernization and upgrading of ginning and pressing factories and aggressive marketing strategy.

Another area, which is an employment generator, is the health care industry. We have only one doctor for 1,800 people, whereas in some of the developed countries the doctor to population ratio is 1 : 600. For providing quality health care to all of our citizens, we would need at least doubling the strength of doctors and paramedical staff in the whole country. The investment for this need not necessarily come from government alone. Hospitals can be set up by the private sector with certain tax concessions and subsidized infrastructural support. Setting up of 30,000 static tele-medicine stations distributed in 30,000 key locations, within the zone of 3 lakh villages and providing 20,000 mobile tele-medicine units will enable reaching of quality health care closer to every home, which are connected to the district, state government hospitals, corporate hospitals, and super specialty hospitals in the country. This is possible as India has a network of satellite communication. How to reach health care for the large number of our population? An innovative method has come into action in certain states. This system provides free health cover to the citizens who are members and pay Rs.10 per individual per month as an insurance

premium. State and Central Governments can sponsor this insurance scheme involving payment of a small premium of Rs.10 per individual per month by the citizens in different states of the country. Such an insurance cover should be able to provide for all types of diseases including expensive open heart surgery. A consortium is required to be formed, in different states between the Government, insurance agencies, corporate hospitals and NGO's for providing integrated cost-effective health care. The scheme when fully operational, can provide direct employment for additional 600,000 doctors and 1.2 million paramedical staff. Apart from providing health care to citizens, these corporate hospitals can attract a large number of medical tourists to the country in view of our competitiveness in treating complex diseases. I am very happy to know that the scientific community for health is working on anti-HIV vaccine development, which is in an advanced stage of development. The success of this programme will be a breakthrough in containing the HIV virus.

With the kind of awareness and opportunities available in ICT, it will soon become a reality wherein every one of our villages will have computers and connectivity available. These would be the window to the world of knowledge for our villages and also to reap the benefits of our e-governance, tele-education, tele-medicine, e-commerce and e-judiciary initiatives. In spite of the all-pervasive nature of the computers they would still be far away from being a truly friendly access device for our villagers. We would need, in such cases, a human intermediary who would act as the village information officer. He will be the extended eyes and ears of the villager to the world of knowledge. India has approximately 2.3 lakh Village Panchayats. I visualize establishment of village knowledge centres in these Panchayats to empower the villagers with the knowledge and to act as a nodal centre for knowledge connectivity for the villagers. The knowledge centre from which the villagers would access the information through the village information officer can also be used for collection, digital storage and dissemination of village-specific information to the villagers. This will provide direct quality employment to over one million who will be instrumental in promoting higher level of wealth generation in our rural sector. The schemes discussed so far have the potential to

generate approximately a total of 56 million direct jobs during the next 5 years. This does not include other employment avenues in the government and the private sectors. Together creating 76 million jobs in the next five years looks feasible if only we take up each of the above schemes in mission mode.

I would like to give ten suggestions on the eve of this Republic Day concerning the role of different constituents of our society in implementing the various programmes leading to creation of employment opportunities and wealth generation :

1. Education system should proactively build entrepreneurial and vocational capacities in students. When they come out of educational institutions they should have the confidence to start small enterprises and also possess the skill to do it. Above all the education system has to impart the spirit that “we can do it”.
2. Rural development has to be a mission mode operation through PURA programme, which will enable provision of maximum benefit to the villagers in a cost-effective way.
3. Banks have to provide hassle free loans to rural enterprises and those who have creative ideas. The banks have to assist them with venture capital. The existing agriculture and agro processing credits have to be increased so that the agriculture communities are empowered for enhancing the productivity of the agricultural produce, food processing and marketing.
4. The Tsunami has caused severe damage to our coastal regions and islands. Our fishermen and others living in those areas have lost their dwellings and livelihood. While planning the reconstruction of homes it is important to take the task as an integrated PURA complex for promoting the prosperity of the coastal region. This can include infrastructure for fish storage and chilling plants, sea food processing and marketing centres, boat and fishing net maintenance centres, schools, hospitals, water sources and other small scale industrial units.

5. In our country we have experience in certain government departments in the field of defence, space, nuclear, agriculture and Metro railway in executing mission mode projects. That has resulted in the empowerment of the programme and removal of normal administrative delays through empowered management structure. Major programmes of the country should use this mission mode management for employment generation schemes.
6. Since the broadband fibre connectivity has reached beyond block level of districts and our satellite communication density has also increased, this is the time for all our IT R&D and ICT industrial establishments to reach out to the rural areas. The e-governance GRID should be established between state and central governments with the National ID as the primary database, linking all parts of the country for providing Government to Government, Government to Citizen Access and extending the tele-education, tele-medicine services to the people in the rural areas.
7. Small scale industries are widespread in our country with tremendous employment potential. For the dynamic and competitive performance, the technological upgradation of these units is essential in the national planning.
8. Media is indeed a dynamic and a creative system in our democracy, and all the more it is important that the media constituents reach out to the 6,00,000 villages of the country and be active partners in the rural development. Artists have a great role to play in the societal transformation.
9. Youth have to create a movement of making their own home righteous, make their environment clean and excel in their studies and their tasks.
10. The national parliamentary system should become the role model for the nation: in legislative performance, in clean and progressive administration and nobility and speedy judiciary.

A new situation is emerging in the national scene in the year 2005. In the Indian history, very rarely we have come across a situation, all at a time, an ascending economic trajectory, continuously rising foreign exchange reserve, global recognition of technological competence, emergence of our 540 million youth both men and women as a dynamic positive force for national development, umbilical connectivities of 20 million people of Indian origin in various parts of the planet, and the interest shown by many developed countries to invest in our engineers and scientists including setting up of new R&D centres. This is the time the nation should launch series of missions in the five areas, that is agriculture and food processing, education and health care, information and communication technology, infrastructure development and self reliance in critical technologies, leading to transforming India into a developed nation by 2020.

Let us rededicate ourselves on this occasion of the 56th Republic Day to build our nation as a nation which provides employment to all, leading to economic prosperity and a nation of civilizational heritage with value system.

எண்ணிய எண்ணியாங்கு எய்துப எண்ணியர்
திண்ணியர் ஆகப் பெறின்

- Thirukkural (200 BC) 666

People who elevate the thoughts, through constant reflection, and are steadfast in their action, will positively achieve what they originally thought.

A Commitment to A Caring Polity

I KNOW I AM going to be with you for slightly more than one hour. You are going to give me all your precious time. Definitely, I am going to convey very important messages on behalf of my Government. However, before starting, I would like to convey a small poem, which I composed this morning in my mother tongue, titled

நாம் எங்கிருக்கிறோம்? Meaning “Where are we?”

|

“ஹம் கஹான் ஹைன்?”

Permit me to share with you this poem which will take a few minutes.

நாம் எங்கிருக்கிறோம்?

எங்கிருக்கிறோம் நாம், என்னருமை நண்பர்களே,
இந்திய மக்களின் இதய வொலி அழைப்பிற்கு,
வரலாற்று வடிவம் தரும் மகாசபையில் இருக்கின்றோம்.
மக்கள் நமை கேட்கிறார்கள், மக்கள் நமை கேட்கிறார்கள்;

“பாராளுமன்றத்து பாரதத்தாய் சிற்பிகளே,
எங்களது வாழ்விற்கு வளங்கொடுங்கள், ஒளிகொடுங்கள்,
எங்களது நல்லுழைப்பே, எங்களுக்கு ஒளிவிளக்கு.
உயர்ந்திடலாம் நாமெல்லாம், உண்மையிலே நீர் உழைத்தால்”

அரசன் எவ்வழியோ, குடிகள் அவ்வழியே,
வளருங்கள் எண்ணத்தில், உயருங்கள் செயலில் நீர்,
வாய்மைமுறை உங்களுக்கு வழித்துணையாய் ஆகட்டும்,
நீவிர் எல்லோரும் வாழ்க! இறைகருணையால் என்றென்றும்.

Where are we?

Where are we now, dear friends,

In the Maha Sabha that shapes as history

The call of heartbeats of Indian people,

People ask us, people ask us;

“Oh! Parliamentarians, the sculptors of Mother India,

Lead us unto light, enrich our lives.

Your righteous toil is our guiding light,

If you work hard, we all can prosper.”

Like King, so the people,

Nurture great thoughts, rise up in actions,

May righteous methods be your guide;

May you all prosper ever with Almighty’s grace.

I am delighted to address the first session of both Houses of Parliament in the New Year. My greetings to all of you. We entered the New Year with mixed feelings. On the one hand, there were so many reasons for us to look forward to this year with hope and optimism; on the other hand, the entire nation was deeply moved by the tsunami tragedy. Induced by a major earthquake in the ocean bed near Sumatra on the 26th of December 2004, a tsunami wave hit the Andaman and Nicobar Islands and the coastal areas of Tamil Nadu, Pondicherry, Kerala and Andhra Pradesh. Our hearts reached out to those who saw their loved ones taken away by a killer wave that washed away the lives and livelihoods of thousands of our people. The entire nation shared the agony of those whose lives and livelihoods were destroyed by the disaster.

Honourable Members will agree with me, however, that the silver lining to this dark cloud was the spontaneous response of our people in coming to the aid of the victims in their hour of need. Apart from the fact that contributions to the Prime Minister’s National Relief Fund have been unprecedented, millions of Indians and friends from

overseas have contributed in their own way, directly and indirectly, to provide relief and facilitate rehabilitation of the affected people.

I must place on record the nation's appreciation of the rescue, relief and rehabilitation work undertaken by state and local governments, the armed forces and non-government organisations. Given the nature of the disaster and the fact that this part of the world had not been visited upon by a tsunami in the living memory of anyone in this region, there was an element of surprise. This was compounded by the fact that the worst affected places were in the far-flung Andaman and Nicobar Islands. Yet, our response was quick. The Indian Navy, Air Force, Coast Guard and Central Paramilitary Forces played a heroic role in providing immediate relief not just to our people but also to the affected people in Sri Lanka, Maldives, Indonesia and Thailand.

My Government very correctly took the view that external assistance was not required for the immediate rescue and relief work. This work was best done by local authorities and security forces and the resources required were available with State and Central governments. India thanks all those who expressed their concern and generously extended their help. We are open to external assistance and advice in rebuilding and reconstructing the destroyed economies and ecologies of the coastal region. We must convert this tragedy into an opportunity by modernising the maritime economy and protecting the coastal ecology.

It is imperative that the momentum generated by our response in the relief and rehabilitation phase is sustained in the reconstruction phase. I hope that we would be able to demonstrate our reconstruction effort as a model of effective, humane and forward-looking public intervention in disaster mitigation.

The Government will shortly create a National Disaster Management Authority. A Central legislation on disaster management will soon be introduced in Parliament. I would recommend that this Authority should have a strong science and technology component built into its activities. We have to develop a long-term strategy in science and technology for dealing with natural disasters and threats

to the ecology of our coastal areas. The need for such an Authority becomes even more pressing in view of the extensive loss to life and property caused by calamities such as the recent avalanches in Jammu and Kashmir resulting from heavy snowfall. The nation shares the grief of the people of Jammu and Kashmir in their hour of sorrow.

The generous response of the people of our country to the tsunami tragedy showed once again that there has been a paradigm shift in our political and social milieu. Those of us, who have been concerned about the social trend towards personal aggrandisement and a political trend towards the politics of exclusion, would have been heartened by the genuine altruism and the sense of inclusiveness that characterised the mood of the nation in the aftermath of the tsunami.

My Government is committed to an inclusive society, a caring polity and a sharing economy. This is the essence of the National Common Minimum Programme adopted by the constituents of the United Progressive Alliance and supported by the Left and other like-minded parties. The UPA's vital contribution to the nation has been the return of the polity to mainstream political values of pluralism, inclusiveness, secularism and economic growth with equity and social justice. The people of India have repeatedly reaffirmed their commitment to these core values of our nationhood.

My Government has been able to enthuse people to re-focus their energies on economic development and social progress. Not surprisingly, a sense of optimism now pervades the country and we can look forward to a year of improved economic performance, communal harmony and political stability. All major economic indicators are looking up and investors have regained their faith in our potential. I believe we must capture this mood of optimism combined with altruism to strengthen the foundations of our inclusive democracy.

In the span of three quarters of a year that the United Progressive Alliance Government has been in office, considerable time and energy has already been devoted to the implementation of the National Common Minimum Programme. More importantly, an environment of social and political stability based on a commitment to the welfare of weaker

sections, especially the scheduled castes, scheduled tribes, other backward classes and minorities has been created. The Government has sustained the process of economic growth with due regard for equity and social justice. It has ensured communal harmony and imparted a new sense of hope to the minorities and the weaker sections of society. My Government has infused a new sense of belonging among various disaffected groups, especially in the North-Eastern States and among the tribal communities across the country. The handing over of the historic Kangla Fort to the people of Manipur was not just a glorious moment in the history of the Manipuri people; it also symbolized my Government's commitment to all segments of our society that they have a right to live a life of dignity and self-respect. It is with this same message that the Prime Minister visited the State of Jammu and Kashmir, to empathise with the people living in the Kashmir Valley, and migrant Kashmiri pandits in Jammu.

My Government has constituted a Commission for the welfare of socially and economically backward sections among religious and linguistic minorities. This Commission will examine the social and economic status of these deprived groups and suggest mechanisms for enhancing their educational, employment and economic opportunities. We will also prepare a White Paper on the status of minority communities in India. Subsequently, the Government will recast the 15-point programme for the welfare of the minorities with a view to incorporating programme-specific interventions.

Adivasis in this country have been leading a life of insecurity in many areas since their property rights have remained unsettled. It is necessary to recognize their need for assured property and land rights in areas they have been residing in for several generations. It is an irony that tribals who have been living in "forest villages" and have been practising agriculture on these lands for several generations, have not been given due recognition of their rights. Their problems are engaging the attention of the Government and we will try to settle the issue of land rights of tribals. The outcome will be beneficial both to tribals and to the goal of forest conservation.

My Government believes that it is its responsibility to ensure that the deprived sections of society are given a fair deal. We are committed to taking steps for their educational and economic empowerment. We should also take simultaneous action to protect their human rights and also free them from age-old prejudices. The Government will take legal action to ban the degrading practice of manual scavenging, and States would be given time up to August 2005 to enforce it. My Government is equally committed to the upliftment and empowerment of physically and mentally challenged persons.

It is absolutely essential that the deprived sections of our society benefit from the growth processes we have unleashed. The Government has constituted a Group of Ministers to engage in a dialogue with industry to explore mechanisms for increasing employment opportunities for Scheduled Castes and Scheduled Tribes in the private sector. The Government has introduced the Reservation Bill in Parliament codifying all provisions on reservation in government. In addition, a Committee of Ministers on Dalit Affairs has been formed to give focused attention to all issues related to the welfare of Dalits.

Honourable Members, an important commitment of the National Common Minimum Programme that the Government has fulfilled has been to hold the price line. Owing to the impact of a weak monsoon as well as the steep increase in international energy prices, the rate of inflation had gone up in the middle of last year. However, despite continued pressure on the oil price front, a judicious mix of economic policies and administrative intervention has helped bring the rate of inflation down. After rising above 8.0% in August 2004, the rate of inflation, as measured by the wholesale price index, has come down to 5.0%. The rate of inflation as measured by the consumer price index has declined and is significantly lower than the wholesale price index. My Government is committed to reining in the rate of inflation as it hurts the poor the most. The Government's success in bringing the rate of inflation down has been the most important of the many pro-poor interventions it has been able to make in the past nine months. The Government will remain steadfast in its resolve to hold the price line and protect the real incomes of the poor.

The control of inflation forms a reassuring backdrop to the revival of investment and business activity in the economy. All macro-economic indicators are looking up. On top of a year of record growth in 2003-04, which was based largely on a recovery from the previous year's poor growth, the economy is once again poised to record close to 7.0% growth in 2004-05, despite a weaker monsoon and higher oil prices. The revival of investment activity and an increase in the rate of capital formation have contributed to an annual growth in 2004-05 of 8.9% in manufacturing output and 8.9% in services sector incomes. Despite a modest 1.1% growth in agricultural production on account of a weak monsoon, food prices have been under check.

Foreign trade has been growing at a rapid pace with exports rising by 25.6% and imports by 34.7% in US dollar terms in the period April–January 2004-05. Investment, both domestic and foreign, has been rising and is a measure of the confidence of investors in our economy. In order to accelerate investment activity further by removing policy and operational constraints the Government has constituted an Investment Commission. While foreign exchange reserves continue to remain at record levels, the revival of investment activity and the consequent increase in import demand has stabilized the rate of accumulation. Overall, all macro-economic indicators are robust and positive and there is an air of optimism in the economy and the markets. My Government will pursue policies that will sustain this recovery and accelerate growth, moving forward on the twin roads of efficiency and equity, while maintaining a high degree of fiscal and financial discipline.

The core commitments of the National Common Minimum Programme are the seven priority areas of Agriculture, Education, Employment, Health care, Infrastructure, Urban Renewal and Water.

My Government is committed to giving a “New Deal To Rural India”. This “new deal” involves, among other things: reversing the declining trend in investment in agriculture; stepping up credit flow to farmers; enhancing public investment in irrigation and wasteland development; increasing funds for agricultural research and extension; creating a ‘single market’ for agricultural produce; investing in rural

health care and education; promoting rural electrification and rural roads; setting up commodities futures markets and insuring against risk in farming and rural business.

One of the first steps that my Government took in office last year was to effect a steep increase in credit flow to agriculture. The entire country was deeply distressed by the misfortune of several farmers in parts of the country, some of whom were driven to desperation and suicide. My government took several measures to address the distress of the affected families and undertook many initiatives to ease the flow of credit to farmers. A special package for doubling the agricultural credit flow in the next three years and for providing credit-related relief to farmers was announced in June 2004. As against the targeted agricultural credit flow of Rs.1,05,000 crore for the year, as much as Rs.99,240 crore had already been provided by the end of January 2005, amounting to nearly 95% of the target. To protect farmers from the vagaries of nature and the uncertainties of the market, the Government has taken several initiatives to provide farm and farm income insurance. The Farm Income Insurance Scheme that was being implemented for Rabi crops has since been extended to Kharif crops also. The modernization of the meteorological forecasting system will also contribute to improvement in our agricultural performance by providing more accurate forecasts of weather patterns.

Horticulture is one of the areas identified for priority attention, for which a National Horticulture Mission is proposed to be launched. This initiative, the details of which will be outlined by the Finance Minister in his Budget Speech, has the potential of transforming the rural landscape and also our export profile of agricultural products.

The problem of water availability and utilization has received special attention in the National Common Minimum Programme. Water is a national resource, and we have to take an integrated view of our country's water resources, our needs, our policies and our water utilization practices. We need to ensure the equitable use of scarce water resources. I urge you and all our political leaders to take a national and holistic view of the challenge of managing our water resources.

We need mass action for the conservation of water. People have demonstrated their capacity to take leadership in this area. My Government proposes to promote water conservation and water harvesting in a major way, through a people's movement. Current programmes for dry land farming and artificial recharge would provide technical support for such a mission, while the investment that is proposed under the wage employment programmes would provide the funds for a citizen citizen- and community-led movement for water conservation. Existing programmes of watershed management would complement this effort, which would also be on a watershed basis. This would address the issue of increasing water availability, especially in our arid and semi-arid regions.

The Government has proposed to launch a new scheme to promote micro irrigation, including drip and sprinkler irrigation in rain-deficient areas. Public-Private Partnership is also crucial for the development of the agriculture sector, especially in rural infrastructure.

The problem of seasonal flooding in the Brahmaputra Valley and in the Gangetic plains is engaging the attention of the Government. To identify long-term solutions and to harness the Brahmaputra and Baraak rivers, the Government has set up a Committee to examine the feasibility of setting up a North East Valley Authority. Financial allocations for the Accelerated Irrigation Benefit Programme (AIBP) have been increased. The Union Budget 2004-05 has taken steps to support water-harvesting schemes for SC/ST farmers. Water management in all its aspects, both for irrigation and drinking purposes, will receive urgent attention. The Government is also pursuing all water-related issues with neighbouring countries in a spirit of co-operation.

Agricultural research and extension will be another area of priority for my Government. Funding for agricultural research is being stepped up. New centres of excellence will be promoted to increase the number of agricultural scientists and graduates to enable the further modernization of agriculture. A "New Deal For Rural India" also requires revitalization of the institutions of rural development. My

Government's commitment to grassroots democracy is reflected in the creation of a new Ministry of Panchayati Raj. In consultation with Chief Ministers, the Ministry has drawn up a 150-point Action Plan covering 18 aspects of Panchayati Raj. The Government will actively involve Panchayati Raj institutions in the implementation of development programmes. The co-operative sector has also been an important instrument of agricultural development in our country. The Government is committed to strengthening co-operatives by infusing a professional management culture and restoring their democratic character. A scheme for the revitalization of the co-operative credit structure has been prepared by NABARD.

A National Committee on Rural Infrastructure has been constituted under the chairmanship of the Prime Minister to ensure that urban amenities and infrastructural facilities are made available in rural areas. A Rural Electrification Strategy has been drawn up to create a rural Electricity Distribution Backbone and Village Electricity Infrastructure. My Government is committed to the objective of providing electricity to all villages in the country by the year 2009. The infrastructure gap between urban and rural areas has to be closed and employment, livelihood and investment opportunities have to be made available in rural areas. This will also discourage distress migration to towns that has imposed enormous pressure on urban infrastructure. We must improve rural roads, schools and health care facilities and public services in a planned manner.

There are many other initiatives that my Government has taken that will greatly benefit the agrarian economy and people living in rural areas. These include programmes and policies aimed at strengthening and modernizing rural infrastructure and improving rural health and education. Taken together, all these initiatives constitute a major developmental thrust for our agrarian economy. That India lives in its villages may be a worn out cliché, but it is a reality that we must constantly remember. Until our citizens living in rural India, especially the farmers and the weaker sections are economically and socially empowered, India cannot shine. My Government wants India to shine, but it must shine for all!

A second area of special attention for my Government is employment. It is a priority for a country in which the share of the youth in our population is rising and will continue to rise for some decades to come. The policies aimed at increasing investment and stepping up the growth rate of agriculture, manufacturing, infrastructure and the services sector will undoubtedly generate new employment opportunities. To take care of those who are likely to be left behind by development processes and to ensure that there is a safety net, especially in some of the more backward regions of the country, my Government has come forward with a National Employment Guarantee Bill. This bill, before Parliament, will provide legal guarantee for at least 100 days of employment to at least one person in every poor household initially in some of the most backward districts of the country. This programme is to be gradually expanded to cover all rural areas. In the interim, the government has also launched a National Food-for-Work Programme in 150 backward districts. The programme was launched from a backward district of Andhra Pradesh on the birth anniversary of Pandit Jawaharlal Nehru. Fifty lakh additional families have been issued Anthyodaya Cards, taking the total up to 2 crore families.

Ours has been a knowledge-based civilization for millennia and yet we remain a country with an unacceptably high rate of illiteracy. Today our best and brightest are at the forefront of the global knowledge economy, and yet many of our schools and colleges are unable to meet the aspirations of all those who seek the light of knowledge. This must change. India needs a new knowledge revolution, a new wave of investment in education at all levels of the knowledge pyramid, from elementary schools in villages to world-class research institutions. My Government will give priority to issues of both access and excellence in education.

Resources for elementary education have been augmented through the Education Cess, which will form the Praarumbhik Shiksha Kosh. This will enable better funding of the Sarva Shiksha Abhiyan, Kasturba Gandhi Balika Vidyalaya, the Mid-day Meal Scheme, and Nutrition Programme for Adolescent Girls. The National Mission for Sarva Shiksha Abhiyan has been constituted for the first time. The launch

of EDUSAT, an educational satellite, and of Doordarshan's Direct-To-Home (DTH) television facility will enable us to use modern technology in spreading literacy. My Government has also given special attention to the educational development of Scheduled Castes, Scheduled Tribes and minorities. A National Commission for Minority Educational Institutions has been established to safeguard the interests of institutes of higher learning set up by minorities.

The Universities of Allahabad and Manipur are being given the status of Central Universities and a special grant has been given to Jamia Millia Islamia. The Government has also sanctioned an Indian Institute of Management for the North-East and has agreed to aid faculty development at Kashmir University.

These are some of the first steps taken by my Government to improve the educational system. Much more needs to be done and will be done. We need a modern educational system that promotes secular values and creates concerned, committed and competent citizens capable of meeting the challenges of the 21st century. We must inculcate in our people greater curiosity about the world around us and promote a scientific temper. The future of our great nation depends on the quality and content of our educational system. The Government has already announced its intent to set up a National Knowledge Commission to give India the knowledge edge in the 21st century. This Knowledge Commission would have five prongs: increasing access to knowledge for public benefit, nurturing knowledge concepts in Universities, knowledge creation in S&T laboratories, promoting application of knowledge in our business and industry, and using knowledge to improve service delivery in Government. The development of basic science and of science and technology will receive the Government's highest priority. The Government is committed to the promotion of public-private partnerships in R&D, especially in bio-technology, space and defence technologies and to increase funding for frontier areas of scientific and technological research.

Another priority area for policy action is health care. A major commitment of the Government is to increase the spending on public health from the present level of 0.9% of GDP to 2.0% over the next

five years, and to improve the delivery of primary health services, especially in rural areas for poor people. My Government proposes to launch a National Rural Health Mission, which will be based on a district-based planning and management model, of health care delivery, with the involvement of Panchayati Raj institutions. This decentralized model of health management will, for the first time, enable localized solutions to health problems, and hopefully will lead to the goal of 'Health for All'.

My Government will also pay special attention to the development of urban infrastructure and to making our towns and cities more livable. For a country where more than a third of the population lives in urban areas, it is time to focus on the task of providing world-class infrastructure and access to basic amenities in towns and cities. This will enable our cities to play the role of magnets of economic growth effectively. A proposed Mission on Urban Renewal will address this need.

A key priority area for my Government is infrastructure. If the Government's objective of enabling the economy to log 7% to 8% growth over the next decade has to be realized, the country will require massive investment in infrastructure. There is urgent need to increase public and private investment in power, roads, railways, ports and inland waterways, civil aviation and housing. A Committee on Infrastructure has been constituted under the chairmanship of the Prime Minister. Our economy requires at least up to \$150 billion worth of investment in the infrastructure sector over the next decade to catch up with our East Asian neighbours.

The Committee on Infrastructure has already laid down a road map for a new Civil Aviation Policy that will improve aviation services, promote domestic airlines, modernize civil aviation infrastructure and offer consumers wider choice. The adhocism and lack of transparency that characterized civil aviation policy in the past, has been replaced by a transparent, forward-looking policy framework that will encourage new investment in this sector. The Government has decided to grant greater autonomy to the National Highways Authority of India, while taking steps to make it more professional and efficient. The rate of

completion of road construction under the national highways programme, especially the Golden Quadrilateral and the North-South and East-West corridors, has been speeded up. The Government will encourage public-private partnership in all infrastructure projects. Special focus will be given to improving rail and road connectivity in the North-Eastern region. My Government is in the process of setting up appropriate mechanisms for this purpose. Road and rail development in Jammu & Kashmir will also be accorded higher priority with the upgradation of several historic links such as the Mughal Road.

The success of our telecom policy over the past decade has demonstrated the benefits of pursuing a liberal policy in the infrastructure sector. The beneficiary of such a policy will, in the final analysis, be the consumer. My Government plans to increase India's tele-density from a lowly 8.4% today to more than 20% by 2008. The priority will be to provide both voice and data transmission connectivity in rural areas. The broadband policy announced recently would enhance Internet connectivity with increased speed. This, in turn, would help our rural areas to take advantage of the benefits of e-governance, e-education and e-health. The digital divide between rural and urban areas must be bridged expeditiously, since it is possible for us to leapfrog into next generation information technology.

The National Electricity Policy adopted by my Government will encourage new investment in the sector, while ensuring that the interests of consumers, including rural consumers, are also served. The success of the Inter Institutional Group in facilitating financial closure of 11 private power projects with an aggregate capacity of over 4000 MW, envisaging a funds commitment of over Rs.13,000 crores, augurs well for future investment in this sector. The initiatives of my Government have significantly boosted the confidence of private promoters and financing institutions in reiterating their commitment to fund viable private power projects. The public response to the sale of Government equity in the National Thermal Power Corporation along with the issue of fresh equity by it through an Initial Public Offer in November 2004 bears great promise for policy initiatives in this area.

To sustain the anticipated increase in our economic growth rate, we have to ensure access to energy. Energy security is, therefore, a key national priority. My Government has taken several steps, both economic and diplomatic, to enhance India's energy security. Public sector undertakings have a key role to play in facing competitive challenges, both domestically and internationally. There is a need for the oil PSUs to leverage their strengths in their respective areas of core competence to optimally fulfil the key role envisaged for them in promoting the national objectives of energy security, accelerated growth rate and sustained economic development. With this in view, an advisory committee on Synergy in Energy has been constituted. My Government launched the 5th Round of New Exploration Licensing Policy on 4th January 2005, providing attractive investment opportunities for companies to explore oil and gas. In addition, my Government will give the highest priority to developing strategies to enhance our capabilities in harnessing alternative sources of energy for our long-term energy requirements.

While these seven areas of concern to our people will receive the priority attention of the Government, emphasis will also be placed on other important sectors, especially the modernization and development of our manufacturing and services sectors. The decline in the share of manufacturing in national income in recent years is a matter of concern. My Government has set up a National Manufacturing Competitiveness Council to increase the productivity of our manufacturing sector, which is vital for maintaining its competitive position in a world where trade barriers are being removed. My Government will give high priority to the acceleration of industrial development at home. There are immense opportunities in a wide range of manufacturing industries, including textiles and garments, automobiles and auto-components, leather and pharmaceuticals that will be tapped. This will receive the special attention of my Government.

The end of the Multi-Fibre Agreement opens up new opportunities for external trade in the textiles sector that Indian industry must tap. The Government will take all necessary steps and reforms to encourage investment in this sector. India has enormous advantages in the textiles sector, both traditional and modern, and must regain its pre-eminent

position in the world market. The revamping of the Khadi and Village Industries Commission should also help in encouraging the growth of the much neglected handloom sector. My Government will encourage the modernization of handlooms and promote their design and marketing capabilities. The plight of weavers has been engaging public attention for quite sometime, but not enough has been done in this regard. My Government proposes to focus on improving the situation of weavers through a time-bound programme spanning the next two years, to be called “Two Years For The Weavers”. Under this programme, traditional looms would be replaced, design capability would be improved for value addition and weavers given access to new technology, credit and markets. Professionals would be incentivised to connect Indian weavers to premium markets where Indian handloom still commands upmarket attention. The biggest challenge in promoting the growth of the manufacturing sector is to promote Brand India, the “Made in India” label.

Over 90% of our labour force is in the informal sector. My Government will set up an appropriate institutional and regulatory mechanism to ensure their welfare. While striving for improved social protection, we must also not lose sight of the need to augment employment opportunities through a judicious mix of incentives and regulation. A National Commission has been appointed to examine the problems of enterprises in the unorganized, informal sector and to make recommendations on providing technical, marketing and credit support to small and tiny enterprises and to self-employed persons in this sector. Based on the recommendations of this Commission, we will design appropriate programmes to ensure that the informal sector blossoms, not only in economic performance but also as a provider of employment opportunities. A Board for Reconstruction of Public Sector Enterprises has been set up to devolve full managerial and commercial autonomy to successful public sector companies while at the same time working out solutions to the problems of loss making ones.

Economic Development and the welfare and socio-economic empowerment of our people are my Government’s topmost priorities. There are, however, forces at work that are inimical to the realization

of these objectives. My Government is determined to deal with all such threats to peace and national security. My Government is fully alive to the internal and external challenges to our national security. It will not hesitate in taking any steps required to deal with the threat of terrorism or attempts to spread disaffection and disturb law and order. The overall internal security situation in the country remained under control in 2004. The three main areas of challenge to our national security have been identified as cross-border terrorism in Jammu and Kashmir, insurgency in the North-East region and Naxalite violence in some states. We need a multi-faceted approach to meet this challenge. The machinery for the enforcement of law and order has to be made more effective. At the same time, we must also deal with the underlying causes that give rise to a feeling of alienation among a section of the people, the large majority of whom wish to live in peace and security. Administration at all levels must become more focused on equitable and people-centred development. My Government would pay equal attention to the development dimension and human rights concerns.

In dealing with these threats, my Government was of the view that the Prevention of Terrorism Act, 2002, had been misused and that this Act was in fact not required since existing laws could adequately handle the menace of terrorism. The Government therefore repealed POTA and amended the Unlawful Activities (Prevention) Act, 1967, to put in place a legal regime to deal with the various facets of terrorism. This does not in any way imply a weakening of our resolve to deal with elements inimical to our national security. The Government will invest in the welfare of our security forces and in the modernization of their equipment.

My Government is committed to paying equal attention to the genuine concerns of the people and redressing their grievances. It will take steps to accelerate the tempo of social and economic development so that young people in Jammu and Kashmir have ample opportunity to live a life of dignity, self-respect and prosperity. In pursuit of peace and normalcy, my Government has repeatedly expressed its willingness to talk to any group provided they abjure the path of violence. Cross-border terrorism remains a potential threat both in our west and east, even though there has been a decline in the number

of terrorist attacks in Jammu and Kashmir in recent months. The infrastructure of terrorism has not been dismantled across the border. The Government has accorded topmost priority to the erection of fencing on the India-Bangladesh border to contain infiltration, smuggling and other anti-India activities from across the border.

Activities of underground groups and ethnic tensions have continued to vitiate the atmosphere in some parts of the North-Eastern States. We are committed to restoring normalcy, so that people of the North-Eastern region can live normal lives and prosper economically. My Government is willing to engage any group abjuring violence in a meaningful dialogue. It is with this spirit that the Government is engaged in a dialogue with various groups in the North-Eastern States. Our government will pay adequate attention to accelerating the pace of development in the North-Eastern region and to ensure that this development takes into account their legitimate aspirations.

The economic development of Jammu and Kashmir and of the North-Eastern States will receive the special attention of my Government. The Government has prepared a plan for the reconstruction and development of the State of Jammu and Kashmir. The infrastructural components of the plan would revitalize the State's ailing tourism industry, create new capabilities and generate employment opportunities. The successful implementation of the proposed projects would require improved governance, transparent and corruption-free administration, peace, security, the rule of law, fiscal responsibility and the economic pricing of public utilities.

To guide the economic development of the North-Eastern States, the North-Eastern Council is being rejuvenated and expanded. My Government is pleased by the favourable response of the people of Manipur to its decision to constitute an independent group to examine the provisions of the Armed Forces Special Powers Act. This Group will recommend whether to modify the existing Act or replace it with a more humane law to address the requirements of national security while respecting the human rights of our people. The region needs a new agenda of hope. The doors of the Government are always open to all groups who are committed to the economic upliftment and the

social and political empowerment of the region. There is no issue, no grievance that is so intractable that it cannot be resolved through a patient, constructive dialogue. This is the only possible way forward. Our democratic system is open enough, and flexible enough to welcome the participation of all shades of opinion. In the final analysis, power in India can only flow from the ballot box; never from the barrel of a gun.

My Government also remains firmly committed to ensuring communal harmony. The National Integration Council has been reconstituted. A Model Comprehensive Law to deal with communal violence is on the anvil. My Government will deal resolutely with any attempts to spread communalism, disturb law and order and deny a life of peace and security to any citizen. The menace of Naxalism is posing a threat to peace and security in many parts of the country. Each State Government will have to devise means to deal with this threat by distinguishing between the genuine demands of the downtrodden and the nefarious designs of anti-national elements. My Government is committed to the welfare of all weaker sections, and will encourage a dialogue with all political forces interested in promoting the welfare of the people in a peaceful manner. However, it will deal effectively with any group challenging the Constitutional authority of a democratically elected Government and resorting to the use of arms.

Modernization of our Armed Forces is one of the priority areas of the Government included in the National Common Minimum Programme. There has been an increase in the allocation of funds for modernization of the Armed Forces. Modernization projects of the Army, Navy and Air Force are well in hand. A number of new projects for induction of various equipment and weapon systems are in progress. In the Department of Defence Research and Development, three prototypes of the Light Combat Aircraft 'Tejas' are undergoing flight-testing and have completed 307 test flights including supersonic flights. The Integrated Electronic Warfare System 'Samyukta' has been successfully evaluated and accepted by the Army. 'Sangraha', an electronic warfare system for the Navy, has been accepted and production orders placed. The 'Nag' third generation anti-tank missile

and ‘Akash’ surface to air missile have undergone successful flight tests. The supersonic cruise missile BrahMos, a joint venture programme with Russia, has been successfully tested for the anti-ship role and is ready for induction. The Main Battle Tank “Arjun” has been successfully inducted into the Army.

As announced in the Common Minimum Programme, a separate Department of Ex-servicemen’s Welfare has been created in the Ministry of Defence. This department would give a special focus and thrust to ex-servicemen’s welfare. A Ministry for Overseas Indian Affairs has been created to give focused attention to issues related to the large diaspora of persons of Indian origin in different parts of the world.

My Government is committed to the reform of Government and to making it more transparent, responsive and efficient. A Model Code of Good Governance for public servants is being drawn up as part of a comprehensive reform of administration and administrative procedures. The Government will set up an Administrative Reforms Commission to prepare a blueprint for revamping the public administration system. The enactment of the Right to Information Act will empower citizens and oblige authorities to be more transparent. As part of the Government’s efforts to enhance the quality of governance, a number of new initiatives are proposed to be taken to ensure that government functionaries, at all levels, are properly trained to discharge their responsibilities, and citizens have an effective mechanism for grievance redressal.

My Government’s foreign policy is based on the centrality of national interests in the conduct of our external relations and the pursuit of our economic interests. The Government has taken important initiatives, keeping in mind the imperative of retaining our freedom of options, remaining alive to our concerns. The Government’s efforts have contributed to making the international environment for India’s development more secure. We have articulated our positions and views clearly so that India’s foreign partners have a better appreciation of the logic of our position on issues of importance to us.

My Government has accorded primary attention to relations with our neighbours and strengthening SAARC. It is my Government’s

earnest desire to work with all our neighbours to create a neighbourhood of shared prosperity and peace. We will reaffirm the importance we attach to realizing the potential inherent in SAARC at its forthcoming Summit meeting. Our approach to our neighbours is founded on the conviction that the peoples of our region have a desire for enhanced co-operation, overcoming perceived barriers and inhibitions. Our effort will be to consolidate and expand traditional friendship while we work to nurture newer partnerships. We value our specially close relationship with Bhutan and we will strive to build on this. We have had the privilege of a special and warm relationship with Bangladesh. India was among the earliest to rush relief and assistance to both Sri Lanka and Maldives, which suffered the impact of the tsunami. This even while we ourselves were coping with the effects of the tsunami in our coastal areas, and assessing the extent of our damage, demonstrates the importance we attach to these relationships and our commitment to good neighbourly ties. The Comprehensive Economic Partnership Agreement with Sri Lanka will further deepen our economic co-operation. President Karzai's recent visit will strengthen our participation in Afghanistan's reconstruction efforts.

Our relations with Pakistan are of utmost importance in our endeavour to create a neighbourhood of peace, stability and prosperity. We are engaged in a serious dialogue with Pakistan and have taken several initiatives in furtherance of that. In proposing a range of steps, including Confidence Building Measures that may be taken in the near term, leading up to longer term economic co-operation, we are responding to the felt desire of our peoples. However, the process of normalisation is critically dependent on Pakistan fulfilling its assurance that it would end its support to terrorist activities.

The India-Pakistan process was recently taken significantly forward. An agreement was reached to start a bus service between Srinagar and Muzaffarabad. It was also agreed in principle to start bus services between Lahore and Amritsar, including to religious places such as Nankaana Sahib. Pakistan also agreed to work towards early restoration of the Khokrapar to Munabao rail link. These measures would enhance people-to-people contacts, which have also provided palpable support to the present process.

Our relationship with Nepal will continue to receive high priority and it remains our view that the problems that Nepal faces today can only be addressed by a constitutional Monarchy and multi-party democracy working together harmoniously on the basis of a national consensus. India has expressed grave concern following the dissolution of the multi-party Government, declaration of emergency and arrest of political leaders by His Majesty the King of Nepal on February 1, 2005.

We greatly value our relations with our major economic partners. India-US relations are on a steady course as they draw on the enduring affinity between our two countries as democracies and as strategic partners. We will continue to build upon the convergences in this relationship, strengthening our bilateral economic interface and the vibrant people-to-people contacts. Our ties with the European Union and its 25 member states have expanded steadily, and on our part, we will work to add momentum to the strategic partnership on which we have embarked, including at the next India-EU Summit in New Delhi this year. We value our time tested and strategic partnership with Russia, which was strengthened by the recent visit of the President of the Russian Federation. The depth of our co-operation illustrates the priority we attach to deepening and consolidating this important relationship. My government has sought to accelerate our dialogue and engagement with China and we look forward to the visit of its Premier as an important bilateral landmark.

The “Look East Policy” has substantially strengthened our linkages with Japan, the member countries of ASEAN and the Republic of Korea. We expect the forthcoming visit of the Prime Minister of Japan to be a significant event in our bilateral ties. Our relationship with ASEAN has taken on new dimensions and we hope to realise its huge potential. India’s effective presence at the ASEAN Summit in November 2004 and the success of the first BIMSTEC Summit in July 2004, helped us forge closer links with our eastern neighbours.

The convergence of our foreign policy and our domestic needs is striking in the context of our energy security. My Government will give full importance to synchronising our diplomatic activity with

our need for energy to fuel our developmental needs. Our established and traditional interests in West Asia, the Gulf and proximate regions, including the substantial presence there of our citizens, shall continue to be reflected in our interactions. We remain committed to the efforts of the international community in finding a just and durable solution to the problems that the Palestinian people have faced, so that they may achieve a State of their own. At the same time, we attach high importance to our friendly relations with Israel, which we hope to strengthen and diversify.

The forthcoming 50th anniversary of the Bandung Conference will be an important occasion to recall a historic initiative taken at a time when the process of decolonisation was starting to gather strength and which prefigured the values of the Non-Aligned Movement. In this spirit, we will continue to pursue the comprehensive exercise to broaden the range of our relations with countries in Africa and Latin America, on which we have embarked. We will also reaffirm our commitment to the values of the Commonwealth at its Summit meeting in November this year.

This year, we also mark the 60th anniversary of the end of the Second World War and the founding of the United Nations Organization. It is our firm belief that the problems that confront the world today are truly global and are problems without borders, which call for collective approaches. We will play an active and constructive role in all deliberations of global concern. There is growing recognition of India's legitimate aspiration to play a larger role in the UN, consistent with our status and strength. We attach importance to the process of reform of the United Nations as part of the necessary renewal of the Organisation and we intend to articulate forcefully our aspiration to permanent membership of the UN Security Council.

This is a year of many anniversaries. This year we celebrate the Platinum Jubilee of the Dandi March and the Salt Satyagraha launched by the Father of our Nation, Mahatma Gandhi. I hope the entire nation will recall the spirit of idealism and self-sacrifice that characterized this High Noon of our freedom struggle. With nothing more than the salt of our own land, Gandhiji made colonial rule

unacceptable in a non-violent manner that captured the imagination of the entire world.

In commemorating the Salt Satyagraha, every Indian must rediscover pride in our quest for freedom and self-respect and recapture the confidence shown by our forefathers who won us liberation from colonial rule. We have come a long way in these 75 years. Today India stands tall in the comity of nations, as an independent Republic committed to the principles of freedom, secularism, pluralism and the welfare of all.

This year is also the Centenary Year of the great national upheaval against the designs of the British Raj on the issue of partition of Bengal in 1905. My Government salutes the contributions of Gurudev Rabindra Nath Tagore and other leaders of the national movement who opposed the heinous attempt of Lord Curzon to divide Bengal. We acknowledge with gratitude the leadership and commitment of national leaders and Gurudev Tagore in uniting people, strengthening communal harmony and protesting against this partition, which was later on withdrawn by the British Raj due to the massive mobilization of people.

Recently, the country celebrated the 150th anniversary of India-Post. In a fitting tribute to India-Post, the Government recently took initiatives to market the 'Dot.in' domain. I hope Honourable Members who have their own websites will now switch to the 'Dot.in' domain! This year marks the 125th birth anniversary of the renowned writer Prem Chand. He not only introduced to Hindi and Urdu prose a new genre of writing that endeared him to generations of Indians, but through his prose, placed the plight of the ordinary Indian, the *aam admi*, at the core of our concerns. I hope Prem Chand will be rediscovered in every school by every child across the length and breadth of our vast Republic.

The year 2005 marks the 50th anniversary of the death of Albert Einstein and the 100th anniversary of what is often called his "annus mirabilis". That was the year when a 26-year-old patent clerk published three of his four greatest works, including the theory of relativity. My Government will celebrate Einstein's anniversary by paying special attention to basic sciences in our schools and colleges, modernizing

and reforming our institutions of science and, above all, rededicating itself to the spread of scientific temper.

I am sure Honourable Members will join me in expressing our admiration for the energy and enthusiasm with which our young women and men are participating in an increasing range of sports and winning laurels for the country at home and abroad. I believe this augurs well as we prepare to host the 2010 Commonwealth Games and stake our claim to host the 2018 Olympics.

This Government had promised a “New Deal to Rural India”. In my address to the nation on the eve of the Republic Day, I had outlined a vision for rural development. The vision envisages total eradication of poverty, excellent and affordable opportunities for education and skill development for all citizens, health care for all and sanitation coverage and generation of higher income levels for all Indians. In addition, Indian agriculture, manufacturing and services sectors will not only cater to domestic needs but also acquire leadership positions in the global economy. My Government will promote rural development by providing urban amenities in rural areas (PURA). Physical connectivity, electronic connectivity and knowledge connectivity will achieve economic connectivity.

Rural India should be seen as a growth engine and public investment is required in the area of rural infrastructure to unleash its growth potential. My Government proposes to undertake a major plan for rebuilding rural India called “Bharat Nirman”. This will be a time-bound business plan for building rural infrastructure in the areas of irrigation, roads, housing, water supply, electrification and telecommunication connectivity. The Government will indicate specific targets to be achieved under each of these goals. It is the Government’s firm resolve to make rural India realize its inherent potential. Bharat Nirman would be the platform on which my Government will construct its ‘New Deal for Rural India’. The details of this programme will be outlined by the Union Finance Minister in his Budget Speech.

You have the heavy burden of legislative work pending before you. This session will discuss the Union Budget and other Legislative

business. There are several important bills at various stages of deliberation awaiting your consideration. The people of India anxiously await your views and your decisions on these crucial economic and social legislations. I urge you, Honourable Members, to repay the trust and confidence that the people have reposed in you by dedicating yourselves to the orderly consideration of these Bills. Every minute of Parliament's time is precious and every citizen and taxpayer values it greatly. I sincerely hope you will make the most effective use of the time at your disposal and meet the citizens' expectations and fulfil their aspirations.

I wish you all success in your deliberations.

खत्म करता हूँ अब दुआ पै कलाम,
तुम सलामत रहो हजार बरस,
हर बरस के हों दिन पचास हजार।

Innovation – An Engine of Knowledge Society

I AM DELIGHTED to participate in the Indian Innovation Awards 2005 organized by the Entrepreneurial Management Processes International (EMPI) in collaboration with NDTV and *Business World*. I greet the organizers who are celebrating Indian Innovative Organisations towards promotion of a culture of innovation among our entrepreneurs. I congratulate the award winners, Infrastructural Leasing and Financial Services, Narayana Hirudayalaya, BAIF Development Research Foundation, Mother Dairy Food Processing Ltd., All India Society for Electronics and Computer Technology, National Stock Exchange of India and the Department of School Education, Government of Nagaland. I understand that these seven innovative organisations have been selected through a process of selection from 569 participants. I was thinking, what to discuss with the teams assembled here. I have chosen the topic, “Development challenges in reaching difficult regions of the Nation”. To begin with let us discuss the engine of knowledge society which is innovation.

During the last century, the world has undergone a change from agriculture society, where manual labour was the critical factor, to industrial society where the management of technology, capital and labour provided the competitive advantage. Then the information era was born in the last decade, where connectivity and software products are driving the economy of a few nations. In the 21st century, a new society is emerging where knowledge is the primary production resource instead of capital and labour. The knowledge society is powered by innovative capacity. Efficient utilisation of this existing knowledge can create comprehensive wealth of the nation and also improve the

quality of life — in the form of better health, education, infrastructure and other social indicators. Ability to create and maintain the knowledge infrastructure, develop knowledge workers and enhance their productivity through creation, growth and use of new knowledge will be the key factors in deciding the prosperity of this Knowledge Society. Whether a nation has arrived at a stage of knowledge society is judged by the way the country effectively deals with knowledge creation and knowledge deployment in all sectors like IT, Industries, Agriculture, Health Care etc. Innovation is the key element in building the knowledge society. Knowledge society in turn leads to developed societies. I am very happy that with institutions that deal with entrepreneurship, electronic media and print media in business are joining together, taking the innovation as an important task.

Now I would like to discuss the ingredients of Knowledge Society.

Knowledge is converted into wealth for social good through the process of innovation. Innovation is an important factor for the competitiveness of both service and manufacturing sectors. Innovation is mainly fed by dynamic organizational change and also in various walks of life borne out of experiences of individuals and groups and at times from R&D labs also. Hence there is an urgent need to establish an efficient innovation system in the country. Such a system would involve creation of clusters, which are networks of :

- (a) Inter-dependent firms,
- (b) Technology and knowledge producing institutions like universities, colleges and institutes, research institutes, and technology providing firms,
- (c) Bridging institutions like think tanks, providers of technical or consultancy services, and
- (d) Customers linking the value-added production chain.

The concept of clusters goes beyond that of a firm network, as it captures all forms of knowledge sharing and exchange. Thus, an innovative system with its clusters would tap into the growing stock of global knowledge, assimilate and adopt it to local needs and finally

create new knowledge and technology. The innovators who have been awarded can replicate their innovations in different parts of the country. Time is now ripe especially since the Government is focused to provide a new deal for the rural India.

In my address to the nation on the eve of the Republic Day 2005, I had outlined a vision for rural development. The vision envisages total eradication of poverty, excellent and affordable opportunities for education and skill development for all citizens, health care for all and sanitation coverage and generation of higher income levels for all the people in the country. In addition, agriculture, manufacturing and services sectors will not only cater to domestic needs but also acquire leadership positions in the global economy. In the Finance Minister's latest budget proposals the programme of Providing Urban Facilities in Rural Areas (PURA) plays a very important role. PURA envisages four connectivities. They are physical connectivity, electronic connectivity and knowledge connectivity thereby achieving economic connectivity.

With the kind of awareness and opportunities available in ICT, it will soon become a reality wherein every one of our villages will have computers and connectivity available. These would be the window to the world of knowledge for our villages and also to reap the benefits of our e-governance, tele-education, tele-medicine, e-commerce and e-judiciary initiatives. In spite of the all-pervasive nature of the computers they would still be far away from being a truly friendly access device for our villagers. We would need in such cases, a human intermediary who would act as the village information officer. He will be the extended eyes and ears of the villager to the world of knowledge. India has approximately 2.3 lakh Village Panchayats. I visualize establishment of village knowledge centres in these Panchayats to empower the villagers with the knowledge and to act as a nodal centre for knowledge connectivity for the villagers. This Village Knowledge Centre will act as an interface for economic activity among the village clusters. The knowledge centre from which the villagers would access the information through the village information officer can also be used for collection, digital storage and dissemination of village-specific information to the villagers. The development of

Village Knowledge Centres has become a reality in the budget proposals of 2005.

There is always a tendency, even among social institutions and social organisations including religious institutions that they would like to select for education, health care and other socially relevant activities, always well developed parts of states (with few exceptions), and preferably urban areas. Particularly, the innovators should always select difficult areas and trigger development to ensure the balanced development of the whole nation.

Here I am reminded of an e-mail which I received from one of our citizens. The e-mail reads as follows:

Here is a piece to remind all of us on whatever health, wealth or light we have, and the importance of sharing it with the less privileged or inherited ones. A few weeks ago National Institute for Mentally Handicapped, Hyderabad, had conducted a sports meet for all the physically and mentally handicapped children at National Stadium, Hyderabad. In one race nine contestants, all physically or mentally disabled, assembled at the starting line for the 100 metre race. At the starting signal, they all started out, not exactly in a dash, but with a relish to run the race to the finish and win. All of them ran except one little boy who stumbled on the asphalt, tumbled over a couple of times, and began to cry. The other eight heard the boy cry. They slowed down and looked back. Then they all turned around and went back ... every one of them. One girl with Down's syndrome bent down and kissed him and said, "This will make it better." Then all nine linked arms and walked together to the finish line. Everyone in the stadium stood, and the cheering went on for several minutes. People who were there are still telling the story. Why? Because deep down we know this one thing: What matters in this life is more than winning for ourselves. What matters in this life is helping others win, even if it means slowing down and changing our course. I would say that, you do not have to slow down. Rather by helping difficult areas, the feed back will make you go faster. If you pass this on, we may be able to change our hearts as well as someone else's. "A candle loses nothing by lighting another candle".

This noble act will promote creativity and socially conscious society among our billion people and they will all become partners in national development.

Since our population is of a billion people, the society in its own way has to make innovations continuously, not only in urban areas but also in rural areas. For example, the honey bee network movement at Ahmedabad is an excellent attempt towards promotion of creativity. Creativity comes from beautiful minds. It can be anywhere and any part of the country. It may start from a fisherman's hamlet or a farmer's household or a dairy farm or cattle breeding centre or it emanates from class rooms or labs or industries or R&D centres. Creativity has got multi-dimensions like inventions, discoveries and innovations. Creativity has got an ability to imagine or invent something new by combining, changing or reapplying existing ideas. Creativity has an attitude to accept change and newness, a willingness to play with ideas and possibilities, a flexibility of outlook, the habit of enjoying the good, while looking for ways to improve it. Creativity has a process to work hard and continually to improve ideas and solutions by making gradual alterations and refinements to their works. The important aspect of creativity is: seeing the same thing as everybody else, but thinking of something different. Now I would like to share my experiences with National Innovation Foundation.

I have seen in Ahmedabad the working of "the National Innovation Foundation" which is able to attract a number of innovations coming from the rural sector. However, what they need is design input to make it into a competitive marketable product. I would recommend a collaborative venture between the Entrepreneurial Management Processes International (EMPI) and National Innovation Foundation to work on converting the promising innovations into a commercially viable venture. This can lead to creation of a number of enterprises in the rural sector leading to large scale employment and wealth generation in the rural areas. The establishment of enterprises for such ventures can be financially supported by the institutions like IL & FS.

Now I would like to suggest a method by which EMPI and other partners can make productive use of the valuable data generated through the conduct of Indian Innovation Award Scheme.

The Entrepreneurial Management Processes International has received 569 applications on different areas relevant to the development of our society such as: public policy, physical infrastructure, social infrastructure, rural development, high technology and manufacturing industries, new convergent media, service industries – banking, insurance, hospitals, agriculture, food, water management and environment. EMPI can create a forum in which the proposals submitted for the award can be discussed facilitating its dissemination to intended users and also create market connectivity for wider applications. The faculty members of EMPI could select the top three innovations in each of the areas and prepare them as case studies for the students of EMPI. The television partner NDTV and print partner *Business World* can make these innovations as episodes and disseminate to different institutions through their channel. This will be an effective method of promoting these innovations towards societal applications. Can you take up this challenge?

For the nation today what is needed is a combination of technology, innovation, leadership and inspired workforce. Let us analyze the dynamics of good organizations for national development. Developed India as defined can be only powered by economic strength.

- The economic strength is powered by competitiveness.
- The competitiveness is powered by knowledge power.
- The knowledge power is powered by technology and innovation.
- The technology is powered by resource investment.
- The resource investment is powered by revenue and return on Investment.
- The revenue is powered by volume and repeat sales through customer loyalty.
- The customer loyalty is powered by quality and value of products.

- Quality and value of products is powered by employee productivity and innovation.
- The employee productivity is powered by employee loyalty, employee satisfaction and working environment.
- The working environment is powered by management stewardship.
- Management stewardship is powered by invisible leadership.

The invisible leadership means exercising the vision to change the traditional role from the commander to the coach, manager to mentor, from director to delegator and from one who demands respect to one who facilitates self-respect. I am sure all the institutions and the future aspiring institutions are spearheaded by invisible leadership. For a prosperous and developed India, the important thrust will be on the growth in the number of invisible leaders and innovative organisations. Once again let me congratulate all the award winners and wish you all success in promoting innovative organisations.

Discovering India – Dynamics of Travel and Tourism

I AM HAPPY to participate in the inauguration of the Fifth Global Travel and Tourism Summit organized by the World Travel and Tourism Council (WTTC) in partnership with the Ministry of Tourism. I am delighted to deliver the inaugural address. My greetings to the organizers, government functionaries, delegates from member countries, tourist operators, infrastructure developers, other participants and distinguished guests. I would like to discuss on the topic “Dynamics of Travel and Tourism”.

The spirit of ‘Discovering India’ is indeed motivated by many kingdoms in the past. That is how Chinese traveller Hiuen Tsang during 630-645 AD visited India and saw the glory of Nalanda University teaching at that time and stayed there for doing research in theology, philosophy and religion. The traveller was first a student and later became a teacher. His 12 years’ travel in India has been highlighted in the book form giving the political, social and education system of the country at that time. In 1017 AD another important traveller from Persia, Alberuni, travelled many parts of India and recorded many aspects of Indian civilization with his analyses and comments. As you all know, the mission of Columbus for “discovering India” in year 1492 ended in discovering another continent, America. Something happened and an American tourist, Thomas L. Friedman, after 512 years of the voyage of Columbus, flies to India and finds in the Information Technology capital Bangalore the ‘crown jewel’ of Indian outsourcing and software industry. It can be seen that discovering India is a continuous process even in 21st century. That is how all of you from many parts of the planet have assembled in this hall of

Ashoka Hotel today. My greetings to all of you for this successful mission of discovering India.

The present day tourism, if we take in India with the billion people, with the vast civilizational heritage of the country, from the Himalayas to Kanyakumari, J&K, Central India, North-Eastern states, Bihar, Western States, the large coastal line, Andaman & Nicobar and Lakshadweep Islands have a lot to attract the tourists. It has sea coast on three sides, it has islands, it has snow-covered hill region, it has desert and it has thick forest regions. All of them are of natural evolution. Many centuries-old monuments, temples, churches and mosques are spread throughout the country. You will find in many parts of the country all three situated adjacent to each other. It is a treat to watch such type of unity. India has one of the Seven Wonders of the World, Taj Mahal. Any tourist can see the continuity of the only enriched civilization of billion people of the largest democracy with multiple religions, multiple languages and multiple cultures.

India, like many other countries, has had a long tradition of religious and spiritual tourism. Our ancestors travelled to the different corners of the subcontinent, sometimes on foot, to visit places of pilgrimage. While the main objective of the pilgrim was to attain communion with the nature, the route always had an element of adventure and of the unexpected. The journey also brought the traveller face to face with the marvels provided by Mother Nature whether in the form of the Himalayas, the deep jungles or the deep blue of the Indian Ocean. This, to my mind, was an ideal tourist package—low in cost but high on experience and adventure—in effect, it gives shape to the tourist's dream. Today there are many types of tourism in vogue. Some of the prominent tourist products are spiritual tourism, ecological tourism, religious tourism, health tourism, festival tourism and cultural tourism. Also the nation attracts researchers, students and teachers to study India's pattern of living and the economic and cultural integrity of the last half a century after independence.

Last year when I was in Dubai, I met the Ruler of Dubai. He said that Dubai was planning to increase the tourist arrival by five times. Once this decision was taken, I found, that the aviation minister was

planning for a new airport and also new types of aircraft needed for attracting the tourists. The surface transport minister was planning a number of additional road lanes required on the highways. The works ministry was planning for increase in the hotel accommodation for accommodating the tourists without disappointment. The health ministry had a road map for waste management and a plan for providing the additional clean water needed. This was the type of integrated response that I found in the whole government to fulfil the national objective. We have to take the message coming out of this experience and plan for the multiple requirements simultaneously for promoting tourism in our country. Last week the President of Maldives was visiting India and I had a discussion with him particularly on Maldives tourism. The tourism in Maldives accounts for over 19% of their GDP, a fifth of total employment, approximately 30% of revenues and 70% of foreign exchange earnings. Tourism, the dominant sector of the country's economy, is very dependent on choices made by external consumers. The Maldives attracts tourists with its beautiful island resorts in the form of aesthetically crafted thatched cottages and bungalows.

In 2004, Maldives had attracted tourists, twice its population. On analysis, I found the reasons for the growth as, that the Government of Maldives gives the islands for development as tourist spots on lease to private enterprises. The private enterprises invest and develop the whole island with self-contained resorts including roads, power system, communication, drainage and waste management system, water, shopping malls, entertainment areas and banking system. There is no Government investment needed for the project.

The Indian Tourism Organisation can study this model and evolve island tourism in Lakshadweep and Andaman & Nicobar. In Lakshadweep, we can also provide hinterland tourist package due to its nearness to Kerala. This will be an additional promotional proposition for our tourism industry. The successful tourism needs quality infrastructure. As in the case of Maldives, there is a need to find special methods by which the tourist infrastructure can be created and maintained at an optimal level of performance. Now I would like to discuss the infrastructural needs of our tourism sector.

When the tourists come to any country, they would like to realize maximum value for the duration of their stay which can come only through reliable and fast travel conditions. Many of our tourist spots need travel by many modes. To enable fast travel what we need is frequent air connectivity to majority of the tourist centres apart from what we have for connecting small and big cities. Complementary to the air travel we can also plan fast train services like Shatabdi Express. Creation of these facilities will involve infrastructural development such as airports, railway line and multi-lane roads to interior India. The physical connectivity, electronic connectivity and knowledge connectivity of the tourist spots can be linked with the PURA (Providing Urban Amenities in Rural Areas) programme of the cluster of villages in those regions. This will provide the economic connectivity through tourist arrivals. In addition to this, we can also think in terms of inland waterways which can attract certain class of people. This mission has to be accomplished through government-private partnership.

Another important infrastructural need is quality clean accommodation. Private/public sector participation should plan adequate number of hotel rooms with various amenities at different tourist centres. The accommodation apart from being central in location should also provide a good environment to attract the tourists. Communication facilities in the accommodation should be such that the guest should feel that he is in touch with the outside world. This helps him to send messages to any part of the world at any time. Recently, during my visit to South Africa, I found that each room had an e-connectivity through which the hotel was in touch with the guests. The guests can also send messages to any part of the world. Also the hotel must be able to provide all the information needed by the guest to plan his visits within his prescribed budget and also available time. In addition, the hotel authorities must ensure safety and security of the guests including their belongings. It is also essential to provide the type of food which the tourists normally prefer in their country including the variety which is special in the area of their visit.

To understand the core competence of the country, a unique schooling with scholars who knew, who have studied, who have done the research on all our tourists assets, should be assembled and they

should teach various categories of tourist managers, workers and grass root level tourist operators. Above all an encyclopedia of Indian tourism should get evolved within the next three years time. This should become the training manual for the tourism personnel and also enable the provision of tourist guide to the visitors. This should provide adequate knowledge to the people, regarding places, their cultural heritage, religious importance and the bio-diversity of the whole nation. The document should enable the visitors to make an appropriate choice based on their interest.

There is a vast imbalance across countries in the number of tourists which they receive. There are some countries, like Maldives, which receive more tourists in a year than their total population. At the other end of this spectrum are countries which hardly have any tourists who come for visiting. Some attention must be given to identify the reasons for the poor performance of this sector in such countries. At the same time, it should be ensured that the natural potential and heritage should not be over used. The case of mountain trails in the Himalayas comes to my mind. Some years ago, it was seen that the incoming trekkers would bring in large amounts of disposable packages and litter the pristine environment of the Himalayas. Strong efforts were made by many socially-oriented groups and organizations to help clean up these hills. It has to become a big movement in the entire hill region.

Here I would like to mention about the experience in Sikkim, which can be followed by other states. The State Government is determined to make Sikkim a premier eco-tourism destination. Numerous initiatives have been taken to preserve the natural beauty and biodiversity of the State. The State has been declared plastic-free five years ago by way of legislation. A portion of Gangtok town has been declared clean zone. The urban waste disposal system in Gangtok over the last two years is going on very smoothly with full co-operation from the residents using scientific disposal methods. Now I would like to talk about regional tourism.

The unique feature of the World Travel and Tourism Council is that it can pay focused attention to the question of regional tourism

as opposed to a country-oriented tourism. We have the unique example of the European Union where tourists can move across international borders without any barriers. This encourages a surge in the flow of tourists who do not have to bother with formalities while crossing from one country to another. This is an example which the World Council can try and convince the countries to emulate in various regions across the world. For example, in our immediate neighbourhood we could think of regional tourist circuits to cover the SAARC region and the ASEAN region. Countries with common heritages and historical civilizations could become natural partners in such regional groupings across the world. Hassle-free travel across such regions would give an immense boost to tourism especially in those countries. Of course national security needs have to be complied with.

I would like to make the following suggestions for implementation in respect of Indian tourism industry which may be true for many countries :

1. In spite of all the variety of tourist destinations available the present tourist arrival in India is 3.7 million. We should work out a strategy through which we can increase this arrival to at least 15 million within the next five years and 25 million within the next ten years in partnership with World Travel and Tourism specialists.
2. Tourism is a mission and needs the working together of multiple ministries and industries, sometimes even nations. The tourism leaders and managers have to be innovative to provide time-bound tourist flow and tourist infrastructure generation.
3. It is essential to derive the successful tourism practices and experiences, followed in different regions of the world, from the conference participants and put them into action in Indian tourism industry.
4. Evolution of a special method by which the Indian spiritual, religious, health and eco-tourism (sea, hill, desert, and island) can be promoted as an individual or an integrated package based on the interest of the tourists. Personalised tourist packages have to be evolved and continuously upgraded.

5. I suggest the design of an inter-ministerial co-ordination system, which will be needed for the development of infrastructure in terms of hotels, road connectivity, air connectivity, communication system, IT-enabled services, health care and human resource development. It is essential to Build, Own and Operate tourism as a public-private partnership venture.
6. Tourism has multiple dimensions. They have to be taught in schools and colleges. Tourism syllabus has to be designed and introduced.
7. It is also important to promote multi-national tourism in specific areas with SAARC and ASEAN countries. Promotion of multinational spiritual tourism connecting important Buddhist centres in India, Nepal and Thailand operated by a single airline can also be considered.

My best wishes to the participants of the Fifth Global Travel and Tourism Summit for useful discussions in creating awareness among various participating agencies about the full potential of the tourism industry so that it can become an instrument of promoting international peace and understanding apart from providing entertainment, learning and wealth generation and relaxation to the individual tourist.

Employment Generation for Rural Development

I AM INDEED delighted to participate in the Inauguration of the National Summit of Rural NGOs of India being organized by the Council for the Advancement of Peoples' Action and Rural Technology (CAPART) of the Ministry of Rural Development. I am happy to deliver the inaugural address. I extend my greetings to the members of the rural NGOs, members of the Confederation of the NGOs of Rural India, the functionaries of the Ministry of Rural Development and distinguished guests. Integrating the work of the large number of NGOs spread in different parts of the country is definitely an important event. This action will have to lead to the integrated development of our village clusters based on the core-competence of the region through the catalytic influence of the participating NGOs. I would like to talk to this gathering on the topic "Employment Generation is the Foundation for Rural Development".

As you are all aware, nearly 700 million people of India live in the rural areas in 600,000 villages comprising 200,000 Panchayats. Connectivity of village complexes providing economic opportunities to all segments of people is an urgent need to bridge the rural-urban divide, generate employment and enhance rural prosperity. Repeating what we are doing for several decades with more of the same, may not be the way to proceed further. We need innovation and transparent performance in our action.

We had certain acres of unutilized land in the Rashtrapati Bhavan. We were discussing how to use this land. Through a brain storming session, we found that we had two options, either we could use it as an extended flower garden or make it people-centric through the other

beneficial plantations. Since Rashtrapati Bhavan is the first home of the country, we thought, it will be more appropriate to use the land for certain societal missions.

We created two herbal farms. One farm was used for assisting the farmers on how to add value to their products by selecting good quality herbs, how to extract, how to store and how to market the product. This will be done in partnership with National R & D Laboratories. Second one, we created for use by the visually challenged people, where they could feel the plant, smell the plant and learn about various plants through the Braille boards.

Simultaneously, we created a spiritual garden. Here we planted very important plants which are valued by people of various religions. This will create Unity of Minds among people of different faiths since all the plantations were in a cluster. In the third area, a nutritional garden has been created where the vegetables and fruits are grown using organic cultivation. In the fourth area we cultivated *Jatropha curcus*, the bio-fuel plant; so that farmers can learn about the *Jatropha* cultivation and the conversion of *Jatropha* into bio-fuel which can substantially increase the earning capacity of the farmers. After nine months to a year, Rashtrapati Bhavan is able to offer something to the farmers, something to the visually challenged people, something to the students, something to the people of different religious faiths and spiritual personalities apart from the lovers of beautiful flowers.

Rashtrapati Bhavan was receiving nearly two lakh visitors a year in the earlier years. Now Rashtrapati Bhavan receives over one million people in a year with varied interests. Some of them are interested in seeing the beauty of the garden, some farmers would like to learn about important herbal cultivation and *Jatropha* plantations, some life science students would like to know more about plants and plant characteristics, religious personalities would like to see the spiritual garden and the visually challenged people would like to have first-hand feel of the herbal garden. The increase of citizens' visit by five times occurred due to the citizen-centric nature of the Rashtrapati Bhavan garden.

What one should be remembered for?

I generally assume that most of the NGOs have a purpose in life and would like to contribute to the welfare of the society. The motto of the NGO can be “what I should be remembered for.”

One study on the contribution of NGO reveals that the certain amount of funds from foreign contributors and grants-in-aid from various departments are being deployed on a yearly basis. However the impact of this investment is not reaching the grass root level in the villages to the expected degree. The study indicates that large contributions of societal work of NGOs are visible in certain southern States and Maharashtra. I would request the NGOs and rural development agencies such as CAPART to assist Bihar, UP and North Eastern States and show their societal spirit, their entrepreneurial spirit, mission oriented approach and assist in rural transformation. Life has offered us an excellent opportunity. There is no great challenge in treading the well laid-out path. Rural NGOs have to create a new path. What are the new paths?

Let us imagine that it has rained for over two hours in a village area. During the rain we observe many streams. Whether the water in the streams reaches the local lake and ponds and is stored for the villagers to use in the subsequent period, or it goes to the sea or gets dried up on the way, is dependent on the contour which has been made in the village and the obstruction-less path created by the Village Panchayat for the flow of water. In some places, the roads are kept at a higher level so that the captured water on the road directly flows into the nearby water bodies. This I have seen in the Mount Abu area. I had the opportunity to see the progress of works being done by the NGOs in different places. In many places the flow of benefits of the scheme comes to a grinding halt as soon as the NGOs or the Government functionaries leave the scene. Hence we have to ensure that a sustainable mechanism has to be created for continuous functioning of the scheme, even if the NGO or government agency leaves the place. How? This should be done by training the local people, so that they can manage the scheme and make the benefits flow to the villagers. Rural Development Ministry must make the Panchayats and the District

Authorities accountable for the sustainable functioning of the scheme. Normally, the lack of maintenance leads to non-operation of many good development works. These maintenance areas can be given to the ex-servicemen after certain amount of training, since members of this disciplined force are spread in all parts of the country. It is very essential in all our development work.

PURA (Providing Urban amenities in Rural Areas) envisages that the employment generation is the foundation for sustainable Rural Development. The integrated methods which will bring prosperity to rural India are: the physical connectivity of the village clusters through quality roads and transport; electronic connectivity through telecommunication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through internet kiosks; knowledge connectivity through education, skill training for farmers, artisans and craftsmen and entrepreneurship programmes. These three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing of the products.

No development work is sustainable or complete unless employment potential is created. Some of the productive employment generation schemes are bio-fuel production, waste land development, water harvesting, bamboo mission, converting fly ash into wealth, cotton cultivation to garment manufacture, health care and village knowledge centre. The details of these schemes I have discussed in my Republic Day address to the nation. Whatever benefits are created in education, health care or other welfare schemes, they are scantily utilized, unless the rural people have a potential to earn.

In the budget estimates for the year 2005-06 certain provisions have been made for generation of PURAs with a scope of integrated village development. The integrated method envisages a mission mode empowered management structure with executive powers at the local implementation levels and by reducing the transactional costs through simplification of procedures of governance.

Cost of creating such clusters depending upon the region and population will vary and will be between Rs.50-100 crores per cluster.

After initial short-term employment during construction etc., we have to plan for initiating actions for providing regular employment opportunities for 5,000 people of a village cluster with a population of 25,000. This has to be done by creating new market-driven enterprises based on the employment generation avenues which I have mentioned to you earlier by promoting entrepreneurship in the rural areas and equipping people with skills for their own self-employment for meeting the needs of economy and society.

Now I would like to discuss how to empower the villages governed by Panchayats with reference to some of the successful rural development models on the lines of PURA.

Knowledge radiates from women. Periyar PURA has a ring road and interconnecting roads covering major villages along with bus transport system. They have provided Internet kiosks through wireless connectivity for many of the villages. Periyar Maniammai hospitals and family welfare centres along with the mobile cancer diagnostic clinic provides health care to the population of the rural complex. Campus provides education from Kindergarten to postgraduation. In addition, they are providing knowledge connectivity through awareness and training programmes for use of organic manure (vermi compost), Yoga and Siddha-based formulations, renewable energy, rainwater harvesting and general health. Women are empowered through Self-Help Groups, entrepreneurship development programmes including training programmes for skill development and micro business activities. Organizers of Periyar PURA have established so far 525 self-reliant Self Help Groups, which provide employment for 8000 rural women through products for which technologies have been transferred apart from other employment generation from support services. They are self-sufficient in energy through solar power and biomass gasifier plants. Towards economic development they have integrated farms, energy plantation, aquaculture, livestock farms and dry land horticulture. They have innovative water management schemes for irrigation. Provision of training to the village community in printing technologies, refrigeration & air conditioning, hardware training, Desk Top Publishing

(DTP), plumbing, electrical wiring, welding/fabrication, bakery and construction technology has created job opportunities to the villagers. The members of the villages are fruitfully employed and they are producing value added products. A transformation has taken place keeping our civilizational heritage intact and converted the rural settings into a livable habitat. I have witnessed the progress of this project.

The message I would like to convey through this model is how an engineering college for women with a vision can transform sixty five villages with a population of three lakhs. They have the passion to transform the lives of the village around them as they thought differently and acted differently. That is how they enriched the society all around. Let me narrate another example from south Gujarat.

I would like to share with you an integrated village cluster development programme which I witnessed during my visit with Dr. Narayan G Hegde, an IIM graduate who is an expert in farming and dairying to two village clusters of south Gujarat - Chonda and Lachakadi, with a population of 5000. In these villages every summer the tribal people migrate to nearby towns. The BAIF model was installed in these two villages with peoples' co-operation and the participation of state authorities. Firstly water harvesting was undertaken to get water for every individual. Every home was provided with livestock and also a market for milk. Simultaneously, fruit orchards were established with various fruit crops such as cashew and mangoes, which are tolerant to drought. When I visited these villages, there was a connecting road and water ponds. The tribal population, with radiant smiles on their faces, was harvesting crops, packaging and carrying milk to different supply points. I happened to see the economic growth and prosperity of the tribal people, which has been facilitated by BAIF with people's participation. I understand that this model – Vadi (Orchard) has now been replicated in many places by the state governments of Maharashtra, Gujarat and Rajasthan.

The project was implemented through Self Help Groups (SHGs) by building mutual confidence. The groups took the responsibility to help the weaker members. This boosted progress. The results were phenomenal. In Ghatol cluster in Udaipur out of 3000 poor families,

more than 90% were able to earn Rs.20,000 per annum. Efficient watershed development not only helped to ensure the availability of safe drinking water throughout the year but also boosted their crop yields from 30% to 80%. Over 800 hectares of Anola orchards were established for the first time in the region, which started yielding from the third year. The farmers' groups have started processing and marketing the fruits. The entire village cluster was self-sufficient in food supply. Dairy and animal husbandry further boosted their family income from 30 to 60%. These families had formed 71 Self Help Groups and 24 village level organizations. They have built their own corpus of Rs.30 lakhs. Similar success was achieved in Banswada district. In Gokulpura cluster in Bundi district in Rajasthan, watershed based multi-disciplinary development facilitated the local farmers to grow two crops during the year while the entire district was receiving food aid under the drought relief. This happened in a region where the average annual rainfall is less than 700 mm and the region was facing chronic drought successively for the third year.

These two examples demonstrate how the Periyar PURA and BAIF can bring prosperity to a village or a group of villages through concerted action to meet the needs of the village community. These are independent examples of "PURA in action". Now I would like to specifically elaborate on Village Knowledge Centre, which has got potential of providing real time communication to the rural people and the employment potential.

With the kind of awareness and opportunities available in ICT, it will soon become a reality wherein every one of our villages will have computers and connectivity available. These would be the window to the world of knowledge for our villages and also to reap the benefits of our e-governance, tele-education, tele-medicine, e-commerce and e-judiciary initiatives. In spite of the all-pervasive nature of the computers they would still be far away from being a truly friendly access device for our villagers. We would need in such cases a human intermediary who would act as the village information officer. He will be the extended eyes and ears of the villager to the world of knowledge. India has approximately 2.3 lakh Village Panchayats.

I visualize establishment of village knowledge centres in these Panchayats to empower the villagers with the knowledge and to act as a nodal centre for knowledge connectivity for the villagers. The knowledge centre will provide to the villagers the real time information about the market details on their products from the agriculture, cottage industry, fisheries and other rural industries in their locality as well as national markets. This also will provide direct quality employment to over one million people who will be instrumental in promoting higher level of wealth generation in our rural sector. In addition, the Village Information Officer will become a vital link between the rural clusters and the NGOs and the other government agencies operating on development tasks in the clusters.

Now I would like to discuss how the members of different NGOs can work together and make our rural area prosperous, happy, and peaceful and a safe place to live in for the 260 million people who are living below the poverty line.

The study of nearly 12,300 NGOs spread in different parts of the country indicates that they are engaged in tasks such as rural housing, rural sanitation, watershed development, irrigation and drinking water, organic farming, agriculture products improvement etc. Also, I find that the funding for the NGOs is coming from multiple ministries and departments such as Health and Family Welfare, Rural Development, Human Resource Development etc. The average total funding from various ministries and departments during any financial year to the NGOs works out to the order of Rs.500 crore. In addition, NGOs receive foreign contributions to an extent of Rs.4000 crore. I was thinking how this large network of committed institutions could be used for rural development at a faster rate. Since the representatives of nearly 2,500 NGOs have assembled here, I would like to share some of the thoughts on how NGOs can be a partner in the rural development with government agencies. Firstly, NGOs must be ready to find new paths of development instead of following the already repeated path. Secondly, the NGOs or the Government agencies when they leave the scene of development; the development initiated has to be made self-supporting and maintaining.

Thirdly, there will be a tendency to take up development in relatively developed states or closer to the urban areas. They are not real challenges. It is more challenging to work in the States such as Bihar, eastern UP and North-eastern States who are having the crying need for development.

In summary, I am having 12 suggestions for the Ministry of Rural Development and its government agencies and also their partners like NGOs for the integrated rural development of the country.

1. Rural development through PURA mechanism will lead to minimum cost and minimum time in execution of the rural development missions.
2. A master plan is essential for development of rural cluster complexes. Ministry of Rural Development can work out the number of PURAs in each of the districts in consultation with the respective states, district administrations and local bodies. And also they can prepare the master plan for individual PURA. NGOs can help in initial identification and preparation of a master plan.
3. Ministry of Rural Development can facilitate the preparation of business plans for each of the PURAs through government, non-government and corporate agencies.
4. Ministry of Rural Development has to arrange fast funding methodology and time-bound action by the executive agency. For enabling this, I would recommend institution of a two-tier management system and identifying a Programme Director. At the apex level an empowered Rural Development Board with participation by all executive agencies has to be created with delegated administrative and financial powers to the Programme Directors. At the next level there can be a project management board with representatives drawn from Panchayats, district agencies, NGOs and other supporting ministries and departments.
5. A management plan has to be evolved and approved by the management boards (Stated in Para 4).

6. The government grants required for development work to be executed by NGOs may be approved on the recommendations of the empowered boards by the respective ministries to avoid duplication and to ensure integrated development of PURA complexes.
7. Empowered boards should encourage NGOs to execute the task in the village cluster through the local talents to the maximum extent possible so that the development tasks become the income as well as employment generation avenue for the rural people till rural enterprises become operational.
8. It is essential to prepare a database of all successful rural development tasks achieved in the country and sustained. I would like to name some of them. Periyar Pura, BAIF Experience, Enhancement of seed cotton productivity in Nava Pind village in Punjab, successful provision of internal roads in Kuthampakkam by villagers (near Chennai) themselves and Siruthuli in Coimbatore. Members assembled here may have many such examples which can be consolidated. This directory can be the guiding post.
9. Rural Development is a very important mission. The fund allotted to various agencies like Government, NGOs etc. have to be properly used for the mission and accounted for, and the results should be seen by the people. A transparent management and performance system is essential.
10. For ensuring continuity of development, the Ministry of Rural Development should have a fixed tenure of five years for all the functionaries of the empowered management system. This will bring a system of accountability among the functionaries, leading to the realization of prosperous rural clusters in a time-bound manner. Change of government or change of personalities should not disrupt developmental programmes.
11. I have a suggestion. The name NGO does not sound well. They can be called as Societal Transformers or any other name you all can consider.

12. Based on the NGOs – Rural Development Agency (CAPART) performance and results, the total budget can be enhanced to Rs.10,000 crore including contribution from other countries.

I inaugurate the National Summit of Rural NGOs of India. I wish all of you, the Government functionaries and NGOs success in your mission of making our rural clusters prosperous, happy and a peaceful place for the village citizens to live in. Our dream has to be to realize reverse migration of people from urban area to rural area.

Providing Water to Every Citizen of the Country

I AM DELIGHTED to participate in the inauguration of the National Water Convention 2005. The topic selected for the convention is “Water for Life with special reference to Interlinking of Rivers in India” organized by the Ministry of Water Resources. I greet the organizers, participants and enlightened dignitaries for addressing this major issue in this annual convention. I was thinking what I can share with the delegates of the conference who have come to discuss the very important issue of water management, particularly conservation, development and management of water resources, and also our concern for providing water for irrigation and good quality potable water for all citizens of the country. There are also other concerns such as ecology, questions of displacement of human habitats etc. Therefore, my address will be on “Integrated Water Mission”.

There are some who have great expectations about linking of rivers. There are also some others who have a question whether this programme will be a blessing for the country.

I would like to discuss four aspects with you.

1. What is the total requirement of water for our nation for drinking purposes, sanitation, irrigation and other industrial uses and what the nation gets through seasonal inputs (rain and melting of snow)?
2. One third of our population is affected by flood or drought every year.
3. Per capita availability of water varies from 10 kilo litre to 50 kilo litre for different seasons and regions.

4. What are the optimal ways of meeting the minimum needs of water for the entire population, assuming a particular population growth rate for the country? We should remember that by 2020 we have to produce approx. 400 million tones of grain and the water requirement will also go up due to population increase.

India gets approximately 4000 billion cubic metres (BCM) of water every year from all natural sources. Out of this 700 BCM are lost in evaporation and another 700 are lost during the flow on ground. Also, the large part of water namely 1500 BCM flows into the sea due to floods. Thus, the remaining available water is only 1100 BCM. Out of this ground water recharge accounts for 430 BCM per year and the present utilized surface water is 370 BCM. The balance unutilized water which can be harnessed is 300 BCM.

I was studying the frequent occurrence of flood and drought. Flood normally affects eight major river valleys spread over 40 million hectares of area in the entire country affecting nearly 260 million people. Similarly the drought affects 86 million people who are spread in 14 States covering a total of 116 districts. Wherefrom this flood comes? It comes from the 1500 BCM of water every year flowing during the monsoon season. If we have to prevent the damage due to the flood and reduce the severity of drought, we have to harness this 1500 BCM of water and distribute it to the drought affected areas. We can also partly store it in proper storage system so that it can be available during non-monsoon months. If we succeed in doing all these, we will not only save the loss arising out of the damage caused to the crops, properties and people by the flood to the extent of Rs.2400 crores on an average per year, we will also save the recurring expenditure of Rs.1200 crores incurred by the government as short term relief measure. The questions which arise are how to harness the flood water? And how to regulate the outflow of flood water so that it does not go into sea and it is converted as useful water for the mankind?

Hence our aim should be to channelise the 1500 BCM of flood water, so that it can be made use of for providing water to drought

affected areas and make sufficient water available to the whole country during non-monsoon months through proper linking, storage and distribution. Our plans must consider that presently the sanitation facilities are not available in more than 50% of the dwelling units in the country. Planners must take into account this aspect while selecting schemes for harnessing and distributing the water for our growing population. We may have to align our interlinking of rivers project for meeting the growing water demands of the nation by having a hybrid scheme which can harness the additional 300 BCM per year and also the flood water of 1500 BCM.

There is an urgent need to find long-term solution to control flood, store and utilize the surplus water during drought. In the Gangetic region, I would recommend construction of layered wells in the entry points of Kosi river. Normally the flood water has certain dynamic flow conditions. The layered wells assist gradual reduction in dynamic flow velocity after filling each storage well. The water thus stored will be useful during shortage period. Similar solution can be found for the north-eastern region. I recommend this scheme can be included in the Interlinking of rivers programme.

Also the scheme chosen must be such that there is continuous availability of additional water for the growing population and the related needs of the nation by regulating the outflow into the sea.

Now I would like to discuss about the possible issues arising out of this mission. The main issues which concern certain number of people are rehabilitation and environmental upgradation.

While working on such large schemes, certain amount of displacement of people is bound to happen. We should aim at minimizing dislocations. We also have to consider the overall impact and benefits of the scheme which in this case is going to benefit nearly 340 million people who are affected constantly by floods or droughts. Rehabilitation Plan should include working out areas required for providing housing for the affected families which have to be relocated, space required for the livelihood either agricultural, artisanal or industrial. Adequate funds required should become the component of the mission of “Connecting Water Resources”. Also, by learning from the problems

of the past, necessary new mechanisms have to be put in place to provide facilities to those who are likely to be displaced well in advance. Governance issues connected with these projects are equally important, as technologies, project management, finances etc. The project report should consist of all these components before seeking sanction.

There are certain apprehensions by environmentalists that the large-scale diversion of water and disturbance to the terrain may endanger or affect geological and ecological balance. It is therefore essential to find solution to their concern and build it as a part of the mission of interlinking of rivers. For example, the afforestation area could be increased by 10 to 15 per cent from the present forest area and also designing the river flow management. Therefore the comprehensive mission planned by the government will have to take into account pooled allocations from the various departments and closely monitored, as it will have impact in every field of development programmes of many ministries of state and central governments.

Science and technology can surely help in executing such missions. India has its own remote sensing satellites and their applications will help in large-scale survey from the source and river flow pattern at various seasons. Optimum water routes and mapping of the environmental profile can be evolved using virtual reality through satellite and aerial imageries. The most important means is to use CARTOSAT-I for getting stereo type pictures on water resources and drought. This should become part of the Water Mission.

During my address to the Andhra Pradesh assembly, it was suggested that the Godavari water which flows into the sea to the extent of 2500 tmc during floods and 750 tmc during normal conditions may be diverted into the basin area for irrigation purposes through step dams, irrigation canals and water storage lakes and ponds. This will increase the irrigated area of the Godavari basin by over 30%. Andhra Pradesh government has agreed to implement this scheme. Also I was informed by the Chief Minister of Goa that the Government of Goa has interlinked Zuari river with Kalay river in Mandovi basin through installation of pumps and gravity flow. This has been done to ensure availability of drinking water in this region. Every State

should be asked to inter-connect their own rivers on the lines of Goa. This should form part of the State Planning. Overall planning of interlinking of rivers has to integrate the state water resource connectivity.

Simultaneously we have to undertake missions for water harvesting, recycling and environmental upgradation, for long-term availability of 800 BCM surface and ground water. I would like to give some examples which have been implemented in different regions for study.

Water harvesting and water recycling should become mandatory for all the states. To improve water table we need to build check dams; develop water sheds, desilt ponds and rivers, clear the inlets and outlets to the ponds and water bodies and recharge the wells. If our rural areas are made to have the operational clean water bodies, recharging of the wells will take place. These activities will also generate employment. Tamil Nadu government has taken the lead and made water harvesting a mandatory requirement for all house holders in the state including rural areas . Studies indicate that this has resulted in considerable improvement in ground water level in this season. Recently the permanent housing scheme for tsunami affected people includes water harvesting in all houses. Some states have taken action to revive lakhs of water bodies of different types. They have also undertaken mini and micro water shed irrigation schemes to improve ground water level in drought prone areas to preserve the local rain water for irrigation.

In addition to water harvesting, water recycling is essential for large consumers such as hotels, public institutions and industries. The recycled water must be used for all purposes including agricultural needs, except for drinking. This will reduce the per capita requirement of water to nearly 25% of the present consumption and enable larger number of population to get adequate potable water and for sanitation.

The status of environmental cleanliness is one of the indicators of development of a nation. As a nation, we have to keep our environment clean and tidy including all our places of worship and rivers. I am delighted to learn the Kali Bein rivulet, the place where Gurunanak

Devji is said to have received enlightenment. Over the years this rivulet had turned into a weed-choked drain. The river is now clean due to the efforts of Baba Balbir Singh Seechewal in partnership with the Punjab State Government. From the discussions, I understand that he organized people's participation in stopping the massive flow of sewage into the Bein and cleaned 160 km long polluted and choked rivulet within the last three and a half years by deploying on an average 3000 volunteer pilgrims per day. Today one can feel the flow of fresh water in this rivulet released from the Tarkina Barrage by the government about a year ago. The revival of the rivulet has recharged the water table as the hand pumps that had become dry for the past four decades are now pumping out water.

While I was thinking how we should solve the problem of improving the environment of rivers and religious places, I find one of our enlightened citizens has taken the initiative and demonstrated the power of ignited individuals to solve a societal problem. Let this model spread in all the places of divine worship and inspire the pilgrims to participate in the task of clean environment in water and air. "Thousands of local initiatives will make India green."

This is an initiative started by Coimbatoreans for Coimbatoreans. This ecological project aims to bring back the glory of Coimbatore and its rich heritage. The project is represented by people from all walks of life and professionally organized. The primary focus is on large scale rain water harvesting, afforestation, sewage/waste water treatment and solid waste management. They have already standardized five of the nine primary tanks in Coimbatore for large scale rainwater harvesting. Over 600 saplings have been planted on the bunds of the de-silted tanks and are being maintained. They are moving towards a target of planting 15 lakh trees by the end of 2005. The comprehensive study has indicated outlet of the city sewage as 10 million litres per day. A pilot plant is being taken up for sewage treatment to treat one million litres per day. The treated water will be sold to the agriculturists and industrialists as a revenue earning measure. The garbage and debris to the extent of over 26,000 cubic metres in one of the city's largest tanks have been removed. This model can be replicated throughout the country.

Recently I had visited Periyar Maniammai College of Technology for women and inaugurated a project called PURA (Providing Urban amenities in Rural Areas) Complex. Over 65 villages near Vallam, Thanjavur district of Tamil Nadu, have been transformed as a PURA Cluster. It has a ring road and interconnecting roads covering major villages along with bus transport system.

They have innovative water management schemes for irrigation and providing potable water for all the village citizens. All 65 Periyar PURA villages are having only rain-fed irrigation. Due to shortage of rainfall in that locality, farmers were suffering due to scarcity of water not only for agriculture but also for drinking purposes. Keeping this in mind, Periyar PURA developed six percolation ponds and five check dams to harness the rain water amounting to 2.73 lakh cubic metre per year. This water is supporting the irrigation of 300 acres of land through recharging their open wells and bore wells. It also supplies drinking water to the people. Periyar PURA has also developed alternate practices such as contour lands, check dams across natural streams for water conservation and developed a model for irrigation for conservation of water. More than 5000 farmers are benefiting from this programme. This example will be useful for water management in PURA complexes.

Our planet will encounter in the next few decades severe shortage of water if we are not careful in conserving and preserving precious water resources. In India, we should have action-oriented plans to foresee the problem and work on a mission mode before the water situation worsens. It is essential that we must have a water management mission that unfurls our vision for the next two decades, integrating interlinking of rivers, water harvesting, water re-cycling, and desalination of sea water using solar energy in specific areas.

I would suggest the following seven action points for this convention.

- (a) Recommending schemes which will ensure availability of minimum 25 kilo litres of water per year for each citizen in the country.

- (b) The schemes chosen should also ensure the availability of water required for producing four hundred million tonnes of foodgrains per year by 2020. Simultaneously, it is suggested that the agricultural scientists need to develop crop varieties, similar to ICRISAT seeds, which will need minimum water.
- (c) Scheme chosen should ensure that no state is affected by flood or drought.
- (d) Water harvesting must be made mandatory for all buildings. Necessary legal provisions may be made in this regard.
- (e) Recommend appropriate legal provisions for making recycling of water mandatory in all buildings particularly large hotels and industries where large amount of water is consumed.
- (f) Expenditure required for rehabilitation and environmental upgradation should become part of the mission of “connecting water resources”. Also a people-oriented governance system should be in place to take care of affected people.
- (g) There are many schemes for interlinking of rivers. Ministry of Water Resources has to consolidate all the best aspects and bring out a cost-effective project report. As a whole, interlinking of rivers has to be a mission mode project.

I wish the 11th National Water Convention success in your mission of providing water for life to every citizen of the country.

ONGC – Fuelling the Economy of the Nation

I AM DELIGHTED to participate in the Golden Jubilee Celebrations of the Oil and Natural Gas Corporation Ltd. (ONGC). On this occasion, I extend my greetings to all the members of ONGC and the pioneers who have nurtured this institution from its inception. I understand that over the years, ONGC has discovered and recovered significant reserves. In addition, it produces a number of value added products such as LPG, High Speed Diesel, Naphtha and Kerosene. Today, I would like to discuss on the topic “Vision for ONGC”.

ONGC is indeed an important organisation in fuelling the economy of the nation. I congratulate the ONGC for its achievements in oil and gas exploration which has now led to the annual production of 27 million metric ton of oil and 25 million metric ton of gas (oil equivalent) in 2004-05. Also ONGC has expanded its activity by working with multinational partners in many countries for oil and gas exploration in a competitive manner through its wholly owned subsidiary ONGC Videsh. In addition to crude oil and natural gas, ONGC is producing and marketing LPG, Naphtha, superior kerosene oil and high speed diesel. Efforts of ONGC have enabled the country to meet around 25% of its oil requirement. We must recognize that the oil and gas derived from the fossil materials from the present wells are fast depleting. Though we are continuously making efforts to find new wells, the success rate is quite low. Hence, there is a need to develop new strategies for realizing energy security followed by energy independence for the nation.

When I am with you, I think of the unfortunate accident, which took place in one of the ONGC platforms in Bombay High on a rainy

day, last month. I would like to commend the ONGC community who bravely combated the situation. All of you worked together to save many precious lives with courage and team work. You did not allow the effect of the accident to percolate in different areas and brought in near normalcy in your operation within a couple of days and maintained the rate of production. The nation is thankful to ONGC for managing this crisis in an excellent fashion and maintaining the energy lifeline of the nation. Let me give a tribute to ONGC based on my experience. I would like to recall what Prof Satish Dhawan, the then Chairman of ISRO, had said after giving me the project “if you do not have a mission, no problem will occur, but if you do have a mission or task definitely problems of varying magnitudes will crop up. But problems should not become the master of the individuals, individuals should become the master of the problem, defeat it and succeed”.

I would like to share with you an experience, which I had when I visited Sudan in October 2003. The President of the Republic of Sudan, H.E. Mr. Omar Hassan Ahmed Al-Bashir, his Minister for Energy and Sudanese team met me with our ONGC Videsh team. During this meeting the Sudanese members expressed happiness with ONGC team partnership in their exploration and oil transportation. They recognized the professionalism of Indian oil and gas experts. They considered India as a preferred partner in all their future oil exploration projects. I am happy that Ministry of Petroleum and Natural Gas has given high priority for such projects which is essential for meeting the energy security needs of our country. ONGC Videsh must keep up this momentum and work with many other countries in the years to come.

With our economic growth, oil and gas requirement is continuously increasing and is around 114 million tonnes per annum at present, the import component of which amounts to over rupees 120,000 crore. ONGC's production is also required to increase to keep pace with this demand. I understand that ONGC is embarking on deep water exploration and increasing the recovery factor from our wealth which is around 28-29% at present. With all your indigenous resources and international co-operation might, you

will be able to reach the target of 50 million tones within the next decade. In such a situation, what can be the vision for ONGC for the next 50 years?

Vision for ONGC, I believe, has to aim at providing to the nation at least 50% of its annual oil and gas need. Since we are dealing with fossil material resources, it may not be possible to meet this requirement fully from conventional oil exploration and extraction alone.

The only way it appears to me is that to meet the 50% oil needs, you have to go to the route of renewable energy, apart from your further exploration of deep sea oil resources and enhancement of recovery factor. ONGC must consider that they are in the broader business of energy and not merely oil and gas exploration. This will enable ONGC to enter into renewable energy routes such as bio-fuel production and development of solar energy.

We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland have been allotted for tree plantation. *Jatropha* can grow well in this wasteland with very little input. Once grown the crop has fifty years of life. Fruiting can take place in this plant in two years. It yields upto five tonnes per hectare oil seeds and produces two tonnes of bio-diesel. Presently, the cost of bio-diesel through the plant is approximately Rs.17 to Rs.19 per litre which can be substantially reduced through choice of right size of the plant and using high yield variety plantation which has already been established by the researchers. Bio-diesel plants grown in one million hectares of land can yield a revenue of approximately Rs.2,000 crore a year and provide employment to over one million people both for plantation and running of the extraction plants. This is a sustainable development process leading to large scale employment of rural manpower. Also, it will reduce the foreign exchange outflow paid for importing crude oil. Use of bio-diesel is carbon neutral. This oil can also be used for soap and candle industries. De-oiled cake is a raw material for composting and plantation is good for honey production. We should absorb the best of technologies available worldwide and start commercial operation soon, instead of staying at pilot plant levels. I am happy that some of the States have

already taken initiatives in having Jatropha plantations in waste lands. However, I also learnt that some farmers have problems in sale of their Jatropha produce. Immediate attention should be given by the respective State Governments to solve this problem so that those who grow Jatropha do not suffer.

There has been a successful experiment which has been carried out by Daimler–Benz in collaboration with CSIR laboratories of running a Benz car from Pune to Delhi using 10% blend of bio-fuel, without any modification to the engine. Now is the time for the state and central governments to come out with the policy which can provide answers to all the questions of the farmers, financial institutions, entrepreneurs who are keen to set up the fully integrated bio-diesel plant using Jatropha seeds from the plantation to production of bio-diesel, by-products and their marketing. It is said that a number of foreign consultants have shown interest in taking up Jatropha plantation and commissioning of plants in different areas of the country. I would recommend ONGC take the lead and enable establishment of model bio-diesel plants with the inputs of Jatropha coming from different parts of the country. ONGC can also undertake research in collaboration with Indian Institute of Petroleum and automobile industry for progressive increase of bio-fuel percentage in blending. Ultimate aim should be to find engines, which can run on bio-fuel alone. This will enable ONGC to work for a target of realizing at least 30 million tonnes of bio-fuels within the next decade. The second area where ONGC can enter in a big way is harnessing of solar energy.

India is well poised for the generation of solar energy in view of the continuous availability of sunshine throughout the year. Installation of centralized solar photovoltaic systems, which can be fed to a grid, will be a long-term economically viable solution with added benefits of pollution control. I am not unaware of the fact that India's economic growth requires addition of 500 MW installed capacity every two weeks and only the well proven conventional technologies such as Hydro, Thermal and Nuclear Plants can fulfil this demand in the short term. But we need to think long term. Present solar cells have the efficiency of 13 to 15%. But the research effort shows that, with the advent of CNT/Polymer Composite Based Photovoltaic Cell, the

efficiency of Photovoltaic cell will increase to 50%. This can pave the way for building mini 100 megawatt solar power stations in different regions of the country like Rajasthan, Andhra Pradesh, Gujarat and Tamil Nadu. ONGC can plan one or two 100 megawatt captive power plants based on solar energy in Rajasthan or Andhra Pradesh. ONGC can also promote indigenous research on mission mode for producing CNT polymer composite based photovoltaic cells with an efficiency of 50% in collaboration with Universities and R&D institutions.

Another area of concern emanates from possible oil spills in our ports and near our coasts. India's present demand for oil is met through import of about 85 million metric ton per annum. Hundreds of tankers are needed to meet the growing import of oil in the foreseeable future. Even if a fraction of the oil imported through these tankers spills in the Indian waters, besides posing environmental danger, there is no comprehensive response mechanism in place to deal with this threat to marine environment. An accident to even one of these very large vessels can spill up to 100,000 tons of oil into the Indian coastal line. India's 7500 kms coastline therefore needs to be safeguarded against ecological devastation from such oil spills.

The need of the day is to launch a mission to deal with oil spills. ONGC has substantial stake in oil production and therefore has to take a lead to find technological response to oil spills in collaboration with Indian Institute of Petroleum and Indian Universities.

I am happy to know that the ONGC has been promoting the concept of PURA (Providing Urban Amenities in Rural Area) in different oil producing zones. ONGC PURA envisages physical connectivity, electronic connectivity and knowledge connectivity thereby creating economic connectivity in the village clusters of ONGC oil producing zone. For employment generation in these areas, they can plan bamboo plantation leading to value added bamboo products enterprises, value added wax products, bio-fuel enterprises and other products based on the core competence of the particular region. They can provide knowledge connectivity through establishment of village knowledge centres connected to Kisan call centres. This type of societal mission

will enable ONGC to nurture local talent for their prime activities in addition to providing large scale employment to our youth in the rural sector.

Within the next fifty years, ONGC must aspire to become a global energy giant. They should explore jointly with others and be a pioneer in large scale suppliers of energy for making India an energy independent country. For realizing this, ONGC should adopt multiple strategies. One of the important resources in the east and west coast is Methane Hydrate deposits, which are expected to be available at a depth ranging from 400 – 700 metres below the seabed. Seismic studies have shown high probability of existence of these deposits. This can be tapped for producing energy. High-pressure technology will be needed to enhance the gas yield. In addition, ONGC must involve in renewable energy area in a big way. Underground coal gasification is yet another promising area where ONGC can achieve leadership. In essence, I would suggest ONGC to give world leadership in management of energy source, exploration of energy sources, diversification of energy sources, technology in underground Coal Gasification and above all finding new ways of tapping energy wherever it is, to meet the ever- growing demand of the country. Once again let me greet all the members of ONGC on this Golden Jubilee occasion. My best wishes to the ONGC in their mission of making the nation energy independent before 2030.

Energy Independence by the Year 2030

I AM DELIGHTED to be here in the beautiful environment of Dehradun and visit the Indian Institute of Petroleum which is carrying out important research work in the areas of refining technology, analytical sciences and petroleum products application. During the last 45 years, the Institute has carried out pioneering research in the hydrocarbon sector and has led many products to industrial applications. I am happy to know that the Institute has filed over 3 dozen patents in India and abroad and is having industrial partnership in every one of its projects. I congratulate the Institution for its significant contribution for the growth of the petroleum refining and processing sector. I was thinking what thoughts I could share with you. I have selected the topic “Energy Independence : Role of IIP”.

As you all know, our annual requirement of oil is 114 million tonnes. Significant part of this is consumed in the Transportation Sector. We produce only about 25 % of our total annual requirement, the reserves of which are fast depleting. The presently known resources and future exploration of oil and gas may give mixed results. The import cost of oil and natural gas today is over Rs.1,20,000 crores. Oil and gas prices are escalating; the cost of a barrel of oil has doubled within a year. This situation has to be combated. Keeping in mind the changing scenario I would suggest to the Indian Institute of Petroleum to provide thrust to research in the areas of alternate sustainable energy sources such as bio-fuel, photovoltaic cell for conversion of solar energy into electricity and hydrogen fuel cell.

We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland have been allotted for tree plantation. Certain multi-purpose trees such as Jatropha

can grow well in wasteland with very little water. Once grown, the crop has fifty years of life. Fruiting can take place in this plant in two years. It yields upto five tonnes per hectare oil seeds and produces two tonnes of bio-diesel. Presently, the cost of bio-diesel through the plant is approximately Rs.17 to Rs.19 per litre which can be substantially reduced through choice of right size of the plant and using high yield variety plantation which has already been established by the researchers. Bio-diesel plants grown in 11 million hectares of land can yield a revenue of approximately Rs.20,000 crore a year and provide employment to over 12 million people both for plantation and running of the extraction plants. This is a sustainable development process leading to large scale employment of rural manpower. Also, it will reduce the foreign exchange outflow paid for importing crude oil, the cost of which is continuously rising in the international market. Use of bio-diesel is carbon neutral. This oil can also be used for soap and candle industries. De-oiled cake is a raw material for composting and plantation is good for honey production.

Bio-diesel has so far not been used for a power plant of large capacity. However, chemical analyses indicate that bio-diesel can safely be used in gas turbines in combined cycle mode, as they are normally used for high capacity power plants. Use of bio-diesel in diesel engines has been well demonstrated.

A quick estimate of land requirements to meet the fuel needs of a 500 MW combined cycle power plant is 2,70,000 hectares, which is significantly large. The yield of bio-diesel is 1.62 tonnes/hectare. The bio-diesel requirement for a 500 MW (CCGT plant) is approximately 4,40,000 tonnes per annum operating at 70% plant load factor. The bio-diesel cost is estimated to be around Rs.20 per litre, which accounts for all the costs associated with plantation and seed collection, oil extraction, trans-esterification and transportation. The risks associated with *Jatropha*-derived bio-fuel appear to be low as these can grow on degraded lands. However, the oil contents in seeds can vary between 28 to 38% by weight.

Indian Institute of Petroleum should work with industry and agriculture universities to design, develop and commission a bio-fuel

plant of one million tonne capacity per annum. It should also carry out research to increase the blending of bio-fuel with diesel from the existing 5% in a progressive manner so that we can aim at a power plant or a prime mover run exclusively on bio-fuel. The research is also required to improve the oil content of Jatropha seed from the present 33% to at least 50% by weight. Another area of interest will be to develop seeds, which can give regular fruiting throughout the year. Development of such seeds can increase the productivity substantially.

Hydrogen holds the potential to provide a clean, efficient, reliable and affordable supply of energy for meeting the growing energy needs in India's economy while protecting the environment and ensuring energy security. Transition from the present fossil fuel-based economy to hydrogen economy will require many challenges to overcome specially in the areas of production, storage, delivery, applications, creating infrastructure, economics and public awareness on safety and standards. Initially we have to concentrate on hydrogen production. Some of the routes which IIP can follow are :

- Microbial degradation of wastes like bagasse and other biomass materials.
- Electrolysis of water for producing hydrogen gas using Polymer Electrolyte Membrane Water Electrolyser (PEMWE).
- Steam reforming of methanol.

I am sure, IIP scientists can definitely make important contributions in these developments with their vast experience in dealing with petroleum refining and processing.

The current high capital costs of solar power stations can be reduced by grid-locked 100 MW sized Very Large Scale Solar Photovoltaic (VLSPV) or Solar Thermal Power Stations. In the very near future, breakthroughs in nanotechnologies promise significant increase in solar cell efficiencies from current 15% values to over 50% levels. These would in turn reduce the cost of solar energy production. The IIP in collaboration with other research institutions,

universities and industrial partners should mount an R&D Programme for developing high efficiency CNT-based Photo Voltaic Cells. They should aim to develop a commercial product within the next three years. This will definitely be an important contribution of the Indian Institute of Petroleum in enabling the nation to achieve self-sufficiency in energy.

The energy scenario in the 21st century is going to see a major shift. Very soon, oil and gas will see its finiteness. It is high time that we realized this factor and work towards the fuel of the future. I suggest that the Indian Institute of Petroleum should think now about re-aligning its research contribution from petroleum to alternate futuristic fuels.

My best wishes to all members of Indian Institute of Petroleum for success in their mission of assisting the nation in working towards achieving energy independence by the year 2030.

Take Green Tech to the people

I AM DELIGHTED to participate in the inauguration of the Green Building Congress 2005 organized by Confederation of Indian Industry (CII). My greetings to the organizers, distinguished guests and all the specialists from architecture, construction and support industries participating in this congress. This congress is conducted at the right time since the nation is working towards energy independence and provision of adequate water supply to our people. As you succeed and grow in your green building mission, your experience will be very useful to the nation. An indicator of building a nation is its buildings. I would like to talk on the topic “Take the Green Tech to the people”. Is it possible?

Energy is the lifeline of modern societies. But today, India has 17% of the world’s population, and has just 0.8% of the world’s known oil and natural gas resources. We might expand the use of our coal reserves for some time and that too at a cost and with environmental challenges. The climate of the globe as a whole is changing. Our water resources are also diminishing at a faster rate. As it is said, energy and water demand will soon surely be a defining characteristic of our people’s life in the 21st century.

Energy independence rests on two principles. The first, to use less energy to provide services and cut down energy losses. Simultaneously we should access technologies to provide a diverse supply of reliable, affordable, renewable and environmentally sustainable energy.

The typical features cited for green buildings are noteworthy goals towards greater energy efficiency and use of renewable energies,

efficient water management and above all caring for the environment. In India, the attempt towards gathering experience by practically implementing the green buildings had already commenced. Some are already completed and many are in the pipe line. Maybe it is time for us to study the economic and environment viability and also share the experience on a continuing basis. This will popularize the mission of green buildings and will one day percolate to every house that we build in our society. Will it be possible, or green building will become building of the high society? If it is so, I would not have been with you. I am with you because there is hope.

It is reported that the total electric energy generated through various methods such as thermal, hydro, nuclear, wind and other forms in our country is about one trillion units in a year. Efforts should be made to improve generation efficiency, to make full use of the installed capacities. Out of this only around 600 to 700 billion reaches the consumer due to various technical, distribution losses. It is necessary to plug these losses. In addition our end use segments are not energy efficient either. In a growing economy when our population is expected to grow approximately at 1.3% energy consumption rate is expected to grow at 4.3% per annum. This trend would strain the energy sector to a large extent. Building sector being the major energy consumer can contribute to a large extent to discuss this issue since green buildings have the potential to save 30 to 40% energy. Some of the salient features of the green building are:

- (a) minimum disturbance to landscape and site condition,
- (b) buildings have to be architected with sun and earth orbit conditions such that maximum natural light and breeze are received and minimum heating is possible,
- (c) use of non-toxic, recycled and environment-friendly building material,
- (d) efficient use of water and water recycling,
- (e) use of energy-efficient and eco-friendly equipment,
- (f) use of renewable energy, and

- (g) high quality indoor air, provisions for human safety and comfort and friendly to differently challenged people.

I would like to narrate some of my experiences in Rashtrapati Bhavan. In Rashtrapati Bhavan I have two offices, one in the ground floor and the other one in the first floor. When I started working, I found that all the doors and windows with beautiful curtains were kept covered. Because of this practice, the electric lights used to be switched on, from the time I enter the office until I complete my work for the day. During my usual walk in Rashtrapati Bhavan it occurred to me that when the beautiful sun is all around, why all the doors and windows were covered with curtains and the room has been made dark. Either the intention could be that the President should not see the nature at its pure form or it is due to some security concerns. I discussed this with my teams and finally I decided to open the curtains and allow the sun light to come into my office. Once the curtains were opened the available sun light was more than sufficient for my work during the day time. Energy saving in every room is possible. Even the visitors who come to meet me notice the difference. The message is that when we design buildings we should ensure that we are able to make maximum use of the nature's gift such as light, heat and breeze for providing the comfortable living for the occupants. In all the government buildings, we should ensure that the offices are not hidden by curtains. I had an opportunity to see a practical implementation of this in Hyderabad green building and in many locations in Iceland. I am happy to be talking to the experts in the evolution of the green building who have gathered here.

A few years back the prime motivation for us to consider the renewable energy alternatives to the fossil fuel was the concern for our environment alone, much less due to economic reasons. The recent trends in the uncontrolled increase in the cost of fossil fuels have almost nullified their economic advantage. Besides, the newer technologies such as CNT (Carbon Nano Tubes), will improve the efficiency of solar cells, the hydrogen fuel cells and many such green technologies economically very attractive as well. Rashtrapati Bhavan

is considering generation of electricity from renewable resources to take care of its energy needs. One such proposal under consideration amongst many is the setting up of an 8 MW Grid locked Solar Power Photovoltaic Plant occupying an area of 300 by 300 metres for supplying the entire Rashtrapati Bhavan Building complex including the estate. The total energy consumed presently is 10,800 MW hour per year. This plant apart from providing energy will reduce the dumping of carbon-di-oxide by 12,000 tonnes per year, 5760 kg of sulphur oxide and 2720 kg of harmful nitrogen oxide. The cost of the plant will be fully paid back by the saving in the electricity charges in less than 20 years.

While the world of science and technology is focusing on improving the efficiency of photo voltaic cells using nano technology through aligned CNTs to make economic sense of generation of Solar Photo Voltaic energy, many other avenues of using solar energy are also being attempted the world over. One such route is to utilize the solar thermal. They use solar collectors intelligently to provide power for hot water and other heaters; in fact for lighting, fans, lifts, air conditioners etc. are from solar thermal. I consider the combination of the two systems may be even better than the generation of electricity from fossil fuel.

The factors stated above are qualitative factors. Since CII has already constructed the green building at Hyderabad and established all the features, it is time we made a quantitative assessment of the energy saved, water saved, pollution reduction in the atmosphere and enhancement of the efficiency of the people working in the building. Also, this building can be used as a platform for incorporating further features and experimenting before they can be applied to future green buildings.

I understand that the second green building which has achieved Platinum rating with 170,000 sq. feet built-up area has come up in Gurgaon. It will be interesting to compare the overall performance of Gurgaon building with the Hyderabad building for generating more

information which will facilitate realization of full benefits while replicating such buildings in different parts of the country. Is the Gurgaon building greener than the Hyderabad one? Presently, thirteen members of CII are in the process of constructing green buildings in India and in different parts of the world. There is a need to motivate all the five thousand members of CII to incorporate the green building concepts in their future constructions and also mount a programme to convert their existing buildings into green buildings. This issue may be discussed in the Green Building Congress. The magnitude of energy conservation tasks is so high that we should rapidly move out of pilot systems and demonstration units. There has to be a massive time-bound programme for such a conversion and introduction of green practices into our standard building codes. Here I would like to mention about the resource-efficient TERI Retreat for environmental awareness and training which has come up in Gurgaon with an energy saving of over 40%. I hope CII will take a lead by persuading its members and creating an industry which can take green building construction and conversion into major commercial activity with societal impact.

I have one question in my mind. In our country, there are 300 million people who are in the mid-income group category and about 260 million people are living below poverty line. Every one of them dreams about having a roof above their head. In order to make their dreams a reality we need about 100 to 150 million houses to be built in the next 15 years. In fact this massive construction effort will form the backbone of our economy. Today when we talk about the green buildings, it always means a high society building or a high tech laboratory. This Green Building Congress should address how you would give the benefit of the green technology to the middle class and below. While you are thinking of a few hundreds of high tech and high value, specialized green buildings, you can also think of building millions of energy and water efficient dwellings, for the large population of the nation. While creating the building codes which include standards for green practices, it is also important to keep in

mind the special safety requirements for earthquake prone and coastal regions. I feel “take the green tech to the people” has to be the agenda of the Congress.

Now I would like to move on to another important programme of rural habitat which can decongest metros and cities, thus providing excellent opportunities for energy conservation. In a sense they will be new forms of green habitats for India while providing also economic and social opportunities to our rural citizens. The integrated methods which will bring prosperity to rural India are: the physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas and also through broadband wireless; knowledge connectivity through education, skill training for farmers, artisans and craftsmen and entrepreneurship programmes. These three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing of the products. I see in the PURA programme potential for large scale employment generation. The integrated method envisages a mission mode empowered management structure with executive powers at the local implementation levels and by reducing the transactional costs through simplification of procedures of governance. Hence, the important element of rural development happens to be PURA. Each PURA complex will need a large number of dwelling units, hospitals, educational institutions and buildings to house small and medium scale industries. It is essential to plan all these buildings using the green building concept for bringing down the recurring energy expenditure on the establishments and for the PURA household.

Building such nationwide practices requires a large human resource and change in the mindset of the people. The architects and building planners have to play a very important role in the design of the building with the green and safety features. The seeds of this perspective have to be sown in the schools of architecture and town planning. Energy conservation should start right from the location of the site, the direction of buildings, windows, doors and glare. The aim should be to use the

sun and wind to the maximum advantage, while minimizing the wasteful heat load from the sun into the buildings and roofs.

While planning for green buildings in all the sectors of the economy, the availability of materials and equipment will become one of the major issues. Towards this objective, there will be a need to network with several manufacturers in India to create new products and new markets. A few green materials and equipment which are available in the country are: fly-ash cement, fly-ash block, recycled aluminum, recycled steel, recycled tiles, low VOC (Volatile Organic Compounds) paints, bamboo based products, high performance glass, energy efficient equipment & systems, HFC (Hydro Fluoro Carbon) based high efficiency chillers, building controls, green roof, recycled wood, etc. However, they are now being produced in miniscule quantities.

In addition to the above, we have to work on the development of composting toilets, minimum water utilities, low VOC adhesives and sealants, Carpet and Rug Institute (CRI) certified carpets, Forest Stewardship Council (FSC) certified wood, high albedo roof paints, building integrated photo voltaic systems, Cooling Tower Institute (CTI) certified cooling towers, living machines (biological waste water treatment systems), etc. While developing and producing these items, we have also to work on standardization and certification of products. We need to have competent multiple agencies to enable speedy and reliable certification. The material and equipment for green buildings is an important economic activity which will generate employment of a large number of our youth for the construction sector.

I have a few suggestions to make for this Green Building Congress:

- (a) Document the experiences (both successes and problems) from the Hyderabad and Gurgaon green buildings. This may lead to green building code evolution and a process for the best practices. While doing so, the rating systems for green buildings developed by The Energy and Resources Institute

- (TERI) including the Indian codes, standards and best practices may also be taken into account.
- (b) A green building should not only be energy and environment friendly, but also aesthetically beautiful and economically viable. A transparent cost benefit analysis will bring many people into the movement of green building revolution.
 - (c) The green technology of the future will have a significant component of high tech and leading edge research and development in material science and standardized manufacturing processes including the use of prefabricated structures.
 - (d) A nationwide certification programme for the builders and architects for their green and safety awareness must be launched.
 - (e) Water harvesting and recycling will make every building less dependent on external water supply, thus reducing the load on the town and city resources.
 - (f) The green tech itself will become sustainable only when it reaches the rural population, that too to the millions in a PURA like environment.
 - (g) The Indian Green Building Congress can create a website and seek inputs from experts on traditional architectural approach to building design for long term gains and better environmental adaptations. Opinions and advice received from various agencies can be evaluated by expert teams for inclusion in the green building code.

The earth is a living planet. In our galaxy, earth is probably the only living planet. We have therefore a great responsibility not to hurt it. For our future generations to survive, we must be friendly to earth and lovable in taking from it.

Presently, we are generating one trillion units of power for a billion population with certain economic strengths. And also we are using nearly 800 billion cubic metre (BCM) water both ground and

surface. Our aim should be to conserve at least 10 to 15% of energy, i.e. 100 billion units and 10% of water namely 80 BCM which will have a large impact on our economy. A good part of the nation's energy is consumed by the construction industry and the household. By saving energy through green buildings, we will make the air much purer to breathe. Green is safer, economically attractive and above all healthy. I would suggest that this should be the basis on which the "Green Building Congress 2005" should deliberate and prepare a decadal plan for the nation for implementation.

I am happy to inaugurate the Green Building Congress 2005 and wish the members success in their mission of making the nation green through fruitful interactive deliberations and actions.

E-Governance to be Citizen-Friendly

I AM DELIGHTED to inaugurate the e-Governance Portal at Rashtrapati Bhavan. I would like to discuss about “Citizen Centric e-Governance: Technology and Management Policy”.

Good governance is being recognised as an important goal by many countries across the world. They have taken up specific initiatives for open government. Freedom of information is being redefined and supported by detailed guidelines. The internet revolution has proved to be a powerful tool for good governance initiatives. An important dimension of the internet potential is the possibility of providing services any time anywhere. Along with this there is a conscious effort to put the citizen as the centre of focus of the governance. Citizens are being perceived as customers and clients. E-governance has to be citizen-friendly. Delivery of services to citizens is considered as a primary function of the government. Particularly in the democratic nation of the billion people like India, e-Governance should enable seamless access to information and seamless flow of information across the state and central government in the federal set-up.

No country has so far implemented an e-governance system for one billion people. It is a big challenge before us.

I visualize an election scenario, where a candidate files his nomination from a particular constituency. Immediately the election officer verifies his/her authenticity from the national citizen ID database through multifactor authentication, through a multipurpose Citizen ID card. His/her civic consciousness and citizenship behaviour comes from the police crime record. His property record comes from the registration of land authority across the country. His income and wealth

resources come from the income-tax department, and other sources. His education credentials come from the university records. His track record of employment comes from various employers with whom he had worked. His credit history comes from various credit institutions like banks. His legal track records come from the judicial system.

All the details arrive at the computer terminal of the election officer within a few minutes automatically by the act of e-governance software agent which crawls across the various state and central government web services directories through the network and collects the information automatically and presents the facts in real-time without any bias. Artificial intelligence software analyses his credentials and gives a rating on how successful he will be as a politician. Election officer sitting at the remote block of the country decides on the spot and the election process starts. All the voters vote from their home through virtual polling booths. Is it a dream? Is it possible? If possible, when shall we have it? Can we provide good governance to our one billion people? Can the governance speed up the delivery system? Can the governance differentiate between genuine transactions and spurious transactions? Can the governance ensure immediate action for the genuine cases which satisfy the check list for a particular service and keep pending the action on spurious transactions? Can this be done by e-governance at a cost affordable by our nation? If we have this system implemented then I call this as a true e-Governance system for the citizen.

I am trying to seek an answer for these questions by asking another set of questions. Do we have a required e-Governance framework? Do we have a National Citizen database which will be the primary unit of data for all governance vertical and horizontal applications across the state and central governments? Do we have standards for the exchange of secure information with non-repudiation, across the state and central government departments seamlessly? Do we have a secure delivery framework by means of virtual private network connecting across the state and central government departments? Do we have data centres in centre and states to handle the departmental workflow automation, collaboration, interaction, and exchange of information with authentication? Should we have our administrative

systems empowered and reformed to accelerate the decision making? When will the entire administrative bodies be able to contribute more for the national development rather than being entangled in the files? I have just visualized the scenario. Let us try to find an answer to each of the above questions towards providing good and smart governance to our one billion people.

In summary, I visualize e-Governance as defined below:

“A transparent smart e-governance with seamless access, secure and authentic flow of information crossing the inter-departmental barrier and providing a fair and unbiased service to the citizen.”

I have always been in my life an advocate of using technology for the betterment of our society. E-Governance is one such opportunity. I want all of you to remember, the technology is a double edged sword. If we don't have an implementation plan from concept to completion, in less than one or two years, technology will become expensive and we will not be able to reap the benefits. Hence I urge you to implement the e-governance process extremely fast. While you are doing this, you must also have a quantitative measure on the impact of e-governance on the society. Every year, you must be able to produce a number, which states the number of people who have been touched by the benefits of e-governance.

India is transforming into a transparent society. It is essential that government functions which have interfaces or interactions with public, especially where the state and central functionaries have to serve or support and even correct the citizens, have to be done through the tools of information technology and communication. This means, software have to be written to codify the rules, procedures and other related government functions, and public access should be through IT. Then the government functions can provide equal access to all based on predetermined rules and even with rules to govern exception being done in a transparent manner. Since India has the core competence in information technology and communication, the possibility of success to bring in transparency in administration and management through e-commerce and e-business leading to e-governance, is definitely more.

Actions have to be initiated in a mission mode. Appropriate legal instrument to provide government power to such mode of interactions should also be done simultaneously.

The primary data requirement for the effective e-governance is the National Citizen ID Card. It should be a multipurpose secured and authentic ID card. This card should be akin to the Xerox copy of the individual with the multifactor authentication such as photograph, biometrics – fingerprint, iris-based systems and digital signature. India with a population of one billion people should be concerned about providing this card to the citizens at a cost-effective basis. Hence there is a need to select the right technology for the preparation of the card, and online issue of the card also needs to be determined urgently. This challenge must be taken up by the consortium of public and private industries, and academic institutions with the Government. Presently the government is considering the discussion of a bill for introducing multipurpose Citizen ID card.

Several state governments made significant use of IT in government, integration of IT government services and their electronic delivery — some of the examples are Gyandoot in Madhya Pradesh, e-Seva in Andhra Pradesh, and Friends in Kerala. Andhra Pradesh, Kerala, Maharashtra, Rajasthan and Tamil Nadu now provide on-line registration of property transaction. The NCT of Delhi has recently started electronic delivery of registration of birth and death. Karnataka has fully deployed a computer application for the issue of land records under the bhoomi project, and Tamil Nadu has implemented e-Rasi project. In Karnataka computer application captures every single transaction at all districts and Taluk treasuries. Some of the states have developed application for Chief Minister Information System for monitoring activities covering developmental programme, redressing public grievances and disaster management systems. India's first VSAT-based communication network VIDYUDNET, supports real-time data applications for power generation and distribution. Some of these systems can be replicated and used by other states to avoid the duplication of efforts and to speed up the implementation process.

India has already established successful networks like NICNET for connecting state and central government offices, ERNET to connect Educational and Research institutions, RAILNET to connect Railway networks, Airline network which connects the air ticket reservation and its services, using the minimum network bandwidth and provides services to the government units for the last 10 to 15 years. And India also has a multitude of private entrepreneurs providing services. For example, these networks are established for specific purposes and address the vertical domains like government, education and research institutions, and railways; these modes are working satisfactorily and serve the purpose to those domain requirements. Railway network and its Railway portal which provides the reservation, cancellations and other services is the good and big working model in the country. Time has come to integrate the functions of all the networks in a seamless way and provide an internet exchange in the country much the same way our telephone networks of multiple service providers have been integrated. The inter-departmental communication is required to provide citizen-centric services such as interaction, collaboration and transaction with workflow.

These are the islands of successes. There are paths, but they are disjointed. Everywhere there is computerization but they are not interoperable. There are web-based services but again coupled with manual processes which lead to delay.

A comprehensive e-Governance framework needs to be evolved. This framework encompasses the following:

1. Establishment of e-Governance Commission or empowered Board.
2. Establishment of e-Governance GRID across the state and centre. Setting up of the Horizontal GRID across the state governments and interconnecting the Horizontal GRIDS to the Vertical Central GRID.
3. Setting up of e-Governance DATA Centre at the Centre and State Levels and real time updation of data from various units of the government.

4. Setting up a multipurpose, secure, authentic national citizen-ID database as the primary data for all the e-governance services and online issue of Citizen ID card seamlessly.
5. Electronic connectivity through dedicated Broadband, Virtual Private Network (VPN) based connectivity from the Centre to State, State to District and District to Block level and Block to village level through the options like wireless, microwave and VSAT. PURA scheme provides an impetus to electronic and knowledge connectivity.
6. Create language independent operating systems, databases, application servers, mail servers etc. in the Indian languages.
7. Ninety percent of work concerning e-governance should be outsourced and government should only manage the Data Centre and maintain it for on-line application.

These are the challenges that are before us; the conference can discuss and bring out a comprehensive set of recommendations for the effective implementation across the states and central government.

Today's technology in computers and communication has made the death of time and distance, because the computer is extremely fast and the technology is further improving everything that can be solved within the time you have. The network is extremely fast and there is no need to worry about the distance. There is a new paradigm in the democratized information system "anytime anywhere the information can be accessed".

I wish all success in the mission of promoting e-governance in Rashtrapati Bhavan.

Strengthening Relationship between Pillars of Democracy

I AM DELIGHTED to participate in the National Conference on Legal Empowerment on the occasion of National Legal Literacy Day being organized by the National Legal Services Authority. I greet the Hon'ble Chief Justice of India, Hon'ble Justices of Supreme Court and High Courts, judicial officers, legal educators, law students, distinguished legal personalities, social organizations, citizens and other participants. I am happy to see that the National Legal Services Authority is organizing a national dialogue on the strengthening of harmonious relationship between the three pillars of democracy namely executive, legislature and judiciary. When I am with the legal community let me share with you three experiences that have relevance to providing justice in the rural areas with humane element.

During 1940's, when I was a school boy, every day after the evening namaz, my father used to come back and sit outside (thinnai) our home at Rameshwaram. Each day about 10 to 20 families or at times individuals would come to my father and tell their problems on land and house disputes, marriage conflicts and issues involving forsaking of elderly parents. They will get a solution from my father within two or three days. In a similar way, my mother used to meet many womenfolk on Fridays. They will seek her advice. My elder brother himself was Panchayat Court President. The court had five good human beings from various walks of life with one State Government representative. In those days, caste system was not visible at all in that region. I used to see many disputes of human life being settled in our own rural environment. Only if the disputes are not

settled at these two levels they used to resort to higher courts. After 1970s, all these systems with human touch vanished and most of these disputes are going to courts. I feel, since the Panchayat environment is emerging in rural areas, the judicial system at the Panchayat level also can take a shape with the same type of human touch.

Eighty litigation-free villages in Chitrakoot is a good example to be followed by many districts. This will substantially reduce the load in our courts. Recently, I visited Deendayal Research Institute in Chitrakoot, Madhya Pradesh. There I found that the institute is facilitating a cohesive conflict-free society. As a result of this, I understand that the eighty villages around Chitrakoot are almost litigation free. The villagers have unanimously decided that no dispute will find its way to the court. The differences will be sorted out amicably in the village itself. This has happened because of the inspirational leadership at Chitrakoot. This movement has to be encouraged in the rural areas by different State Governments.

I had inaugurated a Mobile Legal Clinic in Ahmedabad in 2003. Mobile Legal Services have two important benefits. Firstly, it creates awareness among the rural population about their rights and responsibilities and also creates a feeling of law and judiciary being very close to the people. This mission should continue.

As an extension of this phenomenon I would recommend creation of Mobile Courts that reach Taluka and Village level. The mobile court can visit different villages and towns periodically and deliver on-the-spot justice to the people, based on the facts and evidence. The legal community can also simplify the procedure of filing the cases and taking the witnesses and address the issue of innumerable postponements. Today's conference should discuss all these three aspects I am discussing, so that some sort of recommendation should go to the government. Three experiences, which I have described, may be considered by the legal community for necessary thoughts and action.

Now I would like to talk to you on the topic “Harmonious Relationship among Legislature, Executive and Judiciary”, based on the topic suggested by the National Legal Services Authority.

Democracy dictates a system in which every citizen can without fear of retribution breathe, express himself, pursue his or her interests and in short, live a life of his or her choice as long as it is wholesome and does not tread upon the rights of others to live their lives with equal felicity. This presupposes a system of balances and counter balances among various specifically identified functional components, which together create, support and nurture the democratic system. The Legislature, the Judiciary and the Executive are the components of such a system.

In a healthy democratic system, each of these segments, pillars as it were, has its own importance and relevance. To segregate one from another altogether into watertight compartments would be less than reasonable, basically because one cannot forget the linkages and may I even say, interdependence among them to quite an extent. All the same, for a democratic system to function in a healthy atmosphere, conducive to the meaningful sustenance and purposeful progress of the citizens, it is necessary to chalk out specific areas of domain for each of these pillars with least encroachments on it from any of the others. Such separation of powers is unmistakable by its presence in all modern constitutions that support a truly democratic system.

The basic concept of the separation of powers would mean -

- (a) The same persons should not form part of more than one of the three organs of the Government,
- (b) That one organ should not control or interrupt with the working of another, and
- (c) That one organ of Government should not exercise the functions of another.

The innate provisions of freedom, democratic governance and law are most secure when the three organs of the system function

independent of one another. Such a system is essential for the functioning of democracy.

In 1690, the Englishman John Locke wrote in his *Second Treatise of Civil Government*, “It may be too great a temptation to humane frailty, apt to grasp at power, for the same persons who have the power of making laws, to have also in their hands the power to execute them, whereby they may exempt themselves from obedience to the laws they make, and suit the law, both in its making and execution, to their own private advantage.”

The French jurist, Montes-quieu, had this to say – “ When the legislative and executive powers are united in the same person, or in the same body of magistrates, there can be no liberty. Again, there is no liberty, if the judicial power were not separated from the legislative and executive. Were it joined with the legislative, the life and liberty of the subject would be exposed to arbitrary control; for the judge would then be the legislator. Were it joined to the executive, however, the judge might behave with violence and oppression. There would be an end to everything, were the same man, or the same body, whether of the nobles or of the people, to exercise those three powers, that of enacting laws, that of executing the public resolutions, and of trying the causes of individuals.”

The Legislature is primarily concerned with enactment of general rules of laws that are germane to all aspects of the conduct of its citizens and institutions. Basically this highlights that it is the will of the people, the sheet anchor of any democratic system that is reflected in the formation of the Legislature, which determines for the common good all the laws and regulations that are to be followed.

Evolving such a legal system of rules and regulations is one thing, but pursuit of activities according to them within the framework of the main system has other facets, which bring in the other two pillars like the Judiciary and the Executive.

Judiciary, as an independent specialized legal system of interpretation and enforcement of laws and regulations, untrammelled

by the Legislature and Executive is absolutely unavoidable in any healthy democratic system. The functions of the Judiciary transcend the simple determination of disputed questions of fact and law and encompass an altogether new dimension of even discharging legislative functions of a different character and calibre without encroaching upon the domain of the Legislature. I am referring to the evolution of case-laws that arise from interpretation of the rules, laws and regulations laid down by the Legislature, of course, consistent with the basic structure of the Constitution. It would not be an exaggeration to say that the interpretation by the Judiciary of the laws and regulations as also the evolution of case laws add flesh and blood to the basic structure of the Constitution which reigns supreme under all circumstances. In a mature democracy, it is important that judges are independent both of Parliament and the Government.

The third pillar namely, the Executive is also expected to be as independent as possible and free of intrusions from the other two. All along it has been said that Executive is the third pillar of democracy, which is independent of the other two. I, however, have a different view. Please do bear with me if I say that the independence that is expected of this pillar is only in theory and mostly eroded in actual practice. How can we expect to have an Executive to function independently when each of its actions is questioned and its functioning is made regularly actionable by and accountable to the independent powers enjoyed by the Legislature and the Judiciary? Large number of regulations exist to constantly keep the actions of the Executive under the watchful glare of the Legislature and the Judiciary and that unquestionably takes away the much bandied-about independence of the Executive. Controls and provisions for interpretations and answerability are also applicable to the Legislature and the Judiciary but in their cases, a built-in system from within would be available for discharging those functions. What happens with the Executive in actual practice is nowhere near such a state of affairs and to that extent I would decidedly not support the contention that the Executive is as independent in its existence and functioning as the Legislature or the Judiciary is. I am not even for a moment questioning the whys or

why not of such controls on the Executive; I am merely stating a fact that I personally have perceived watching our democratic system in actual practice.

It does not need an expert to aver that though the independence of these three pillars is a must for a good democracy in its true form to be maintained and nurtured, there is absolute need to strike at a harmonious balance among them in their discharge of all functions within the system and within the Constitutional framework. What is required is a conscious realization of unseen boundaries that cannot be traversed without causing embarrassment and even injustice to the democratic system and the rights of its citizens. Realisation by each one that the other two are equally vital and significant is essential for a healthy democratic system. Stand off between these systems can only be at the cost of the system itself and is sure to put the system in peril. It is not practicable nor is it advisable to specifically lay down these boundaries to make them inviolable but each of these three pillars is enlightened enough to circumscribe its area of operation to consistently and consciously avoid intrusion into another's territory even where the dividing line is slim and even vague.

This will be possible only if everyone of us realizes the ultimate sanctity of the Constitution and its basic framework that had been so carefully crafted by those who knew what to do and did what they did for the nation's future.

All of us, irrespective of the segment of the system to which we belong, have to regulate ourselves by a code of behaviour, ordained by the Constitution, tacitly or otherwise. Freedom available to a segment, seemingly unfettered by the mandate of the so-called majority, is for formulating wholesome legalistic stipulations within the framework of the Constitution for common good and not for imprudent enactments that have just transient appeal to one particular section or another. Likewise, discreetness is a virtue to be cultivated with alacrity and exercised with circumspection and calculated discretion. The pen, having writ, can certainly move on... with telling effect, to say the least. If one of the organs of the system arranges a midnight rendezvous compromising the rule of law by entering into compromises with

outlaws, it is not exactly getting swathed in glory, but the rule of law gets ravished and the whole system gets relegated with an ever-bleeding wound. Independence of jurisdiction does not mean liberty to licence. Friends, I am not pontificating from the Presidential pedestal but I am only voicing as a concerned citizen his concerns about the denial of the fruits of the rule of law implicitly, yet unmistakably promised to him and his kind by the Constitution of India.

Privileges are meant to be enjoyed with prudence by those on whom they are conferred; they are not meant to make others suffer and certainly they are not meant to be flaunted. Rights are meant to be exercised for achieving the right thing; they are not to be brandished. Politeness and moderation are virtues devoutly to be wished for and self-restraint by each of the organs coupled with respect for the others should become a conditionality to be consciously remembered and conscientiously followed with unflinching loyalty, sincerity and honesty. The earlier the realization comes to each of these pillars, that one cannot live without the other two, for a healthy and dynamic sustaining democratic system, the better for all of us. We should strive to see real democracy blossom forth into a system that allows free flow of the citizen's genuine aspirations. This should facilitate them not only to express but also to develop them further on their own without treading on the others' feet. Such realization would automatically lead to self-discipline and that would be the best prescription for a healthy and resurgent democratic system.

My best wishes to the members of National Legal Services Authority in their mission of promoting nobility in justice to all the citizens of the nation.

PURA – An Instrument for Development

WHEN I AM giving this award, I would like to recall the famous statement of Smt. Indira Gandhi, when she was the chairperson of the Non-Aligned movement, “Born of the universe, we cannot narrow our loyalties. Belonging to humankind, nothing human can be alien to us.” The award reflects the borderless attributes needed in today’s modern world, an ideal for which Smt. Indira Gandhi stood.

Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand has been responsible for cultural preservation, through revival and fostering of handicraft skills, shadow plays and classical works of music recorded for posterity. By singing and performing in public with Thais of all walks of life, she has helped spur an unprecedented revival of traditional music. We greatly admire the participation of Her Highness in the sustainable development work initiated by the King of Thailand in alleviating poverty in the country. Our late Prime Minister Smt. Indira Gandhi was strongly committed for pursuing an agenda of development and poverty alleviation which while ensuring growth also focused on bridging the gap between the wealthy and the economically deprived. Her commitment to the promotion of science and technology and marshalling their application to the development of the nation particularly the rural areas was a deep and abiding one.

I am delighted to assign the Indira Gandhi Prize for Peace, Disarmament and Development to Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand for the great services rendered by her for humankind.

The bi-lateral ties between India and Thailand have been built on a strong foundation of ancient, historical, religious and commercial

links. Many of the experiences of Princess Maha Chakri Sirindhorn have direct relevance in the Indian context where rural development has become one of the key issues and a critical component for national development.

To translate this concept of uplifting the rural citizens, India now has planned a programme called PURA meaning Providing Urban amenities in the Rural Areas. PURA envisages providing physical connectivity, electronic connectivity and knowledge connectivity to a cluster of villages leading to sustainable economic growth. For developing nations PURA will be the instrument for development. Hence, I would like to share some of the Indian experiences.

I would like to describe one of the PURA complexes, which has been developed in Vallam, Thanjavur district of Tamil Nadu involving 60 villages with a population of 3 lakhs. This PURA complex has all the three connectivities — physical, electronic and knowledge — leading to economic connectivity. The centre of activity emanates from the women engineering college that provides the electronic and knowledge connectivity. Periyar PURA has health care centres, primary to post-graduate level education and vocational training centres. This has resulted in large scale employment generation and creation of a number of entrepreneurs with the active support of 850 self-help groups. Two hundred acres of waste land has been developed into a cultivable land with innovative water management schemes such as contour ponds and water sheds for storing and irrigating the fields. All the villagers are busy in cultivation, planting *Jatropha*, herbal and medicinal plants, power generation using bio-mass, food processing and above all running marketing centres. This model has emanated independent of any government initiative. The committed leadership has been provided by the engineering institution. This gives me the confidence that PURA is a realizable proposition and this movement can be multiplied by thousands of entrepreneurs, educational administrators, small scale industrialists and bankers with the support of the government agencies. I have also seen similar PURA complexes in Loni, Maharashtra and Chitrakoot in Madhya Pradesh. Learning from the work of Her Royal Highness we feel that PURA should also have a cultural connectivity.

This model of rural development is applicable to many countries in the developing world. India has taken this as a mission and many organizations are working in collaboration with the local government.

Many people may wonder about the link between peace, disarmament and development which Indira Gandhi Prize symbolizes. One of the main causes of disruption of peace is terrorism. The answer to prevention of terrorism lies in creating a prosperous, happy and peaceful society. Here I find the work of Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand very useful for promoting the cause of the poor and women empowerment.

Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand is no stranger either to India or Indology. She herself is a great scholar in Sanskrit and Indology. Maybe this combination and her frequent visits to India and her in-depth study of many parts of India, would have fuelled her urge to find peace in the world through rural development and culture.

We are indeed happy that Her Royal Highness Princess Maha Chakri Sirindhorn has been chosen by the jury for the prestigious Indira Gandhi Prize for Peace, Disarmament and Development for the great services rendered by her for humankind. I congratulate Her Royal Highness Princess Maha Chakri Sirindhorn and wish her all success in her mission of promoting development and peace to humankind.

Solutions for a Transparent Society

I AM DELIGHTED to participate in the inauguration of the Regional Conference of the South Asian Chapters of Transparency International India. I am happy that the Transparency International India has taken the initiative of arranging this Conference in India, which will give very useful suggestions for improving the governance system. This will also enable maximization of value addition for a given expenditure incurred by the Government in providing the services to the citizens. My greetings to Admiral Tahliani and his team, the social reformers, intellectuals, students and other delegates participating in the conference. I particularly greet Prof (Dr.) Peter Eigen and the International delegates for participating in this Conference and sharing the thoughts on the strategies to be followed for promoting a transparent society. I would like to discuss on the topic “Possible solutions for transparent society”.

It has the following components:

1. Transparency starts at home
2. Mission of the teacher
3. Elevating the young minds
4. Code of conduct
5. Trust and confidence in Governance
6. Elimination of Poverty
7. e-Governance for transparent Administration
8. Some good examples in Governance

9. Need-based services

- (a) Training and empowerment
- (b) Law enforcement

On 21st November 2005, I had visited Adhichunchanagiri Math, attended a function of FUREC (Foundation for Unity of Religions and Enlightened Citizenship) and interacted with over 54,000 students of various schools and colleges of Karnataka. There a 10th class student Ms. M. Bhavani studying in Adichunchanagiri Composite High School, Sharavathy Nagar, Shimoga asked me the following question.

“Sir, What is the role of students to stop corruption which is deeply rooted in our country just like cancer?”

Agony of the young mind is reflected in this question. For me it was an important question, since it came from a young mind. I was thinking what type of solutions we could give. My thought process was the following:

I said there are one billion people in the country and nearly 200 million homes. In general there are good citizens everywhere. However, if we find that people in a few million houses are not transparent and not amenable to the laws of the country, what can we do? These houses apart from parents have one daughter or one son or both. If the parents in these houses are deviating from the transparent path the children can use the tool of love and affection and correct the parents to come back to the right path. I asked all the children assembled in that gathering, in case parents of a few children get deviated from transparency, will you children boldly tell your parents, father or mother, you are not doing the right thing, that is what we are taught by you and in the school. Most of the children spontaneously responded, “We will do it”. The confidence comes from them that they have love as a tool. Similarly I have also asked the parents in some other meeting, initially there was a silence, later, many of them hesitantly agreed that they would abide by the children’s suggestion since it is driven by love. They took an oath from me. The oath was “I will lead an honest life free from all corruption and will set an example for others

to adopt a transparent way of life”. Finally I told the students that they should start a movement starting from their home.

School is the next important environment where the character is getting shaped. The prime learning period for the children is five to seventeen years of age. The student spends approximately 25,000 hours in the school campus. Of course, at home, love and affection are imparted but again most of the time of the day is spent in preparing school’s homework and study, eat, play and sleep. Hence the school hours for children are the best time for learning and need best of environment, mission-oriented learning with value system. I still hear the echo from Bestolozzy, a Greek teacher’s saying, “give me a child for seven years. Afterwards, let the God or devil take the child. They cannot change the child.” That is the great confidence of the teacher. What a golden mission for the teachers of great character and value system in our schools in the country!

While I was in college, I remember the lectures given by the highest authority of the Jesuit institution Rev Father Rector Kalathil of St. Joshep’s college, Tiruchirappalli, Tamil Nadu. Every week on Monday, he will take class for an hour. He used to talk about good human beings, present and past, and what makes a good human being. In this class he used to give lectures on personalities such as Buddha, Confucius, St. Augustine, Califa Omar, Mahatma Gandhi, Einstein, Abraham Lincoln including some scientific personalities and moral stories linked to our civilizational heritage. He also used to talk about great personalities living in the father’s lodge and who had made contribution with values in the service of the people. It is essential in the secondary schools and colleges to arrange a lecture by a great teacher of the institution once in a week for one hour on India’s civilizational heritage. This class can be called as a Moral Science Class. That will elevate the young minds to love the country, to love the other human beings and elevate the young to higher planes.

Now I am reminded of a Tamil classic, which brings out the power of righteousness and provides the code of conduct for the people in high and responsible positions:

அரசியல் பிழைத்தோர்க்கு அறம் கூற்றாவதும்

- சிலப்பதிகாரம்

It means, people who are in high and responsible positions, if they go against righteousness, the righteousness itself will get transformed into a destroyer. Whoever deviates from righteousness, whether they are individuals or states, they are responsible for their own actions. This message is brought out very clearly by Elangovadikal in *Silapathikaram*. *Silapathikaram* is one of the five great epics written nearly 2000 years ago in Tamil language. So far I have been talking about the strategies needed for creation of enlightened citizens and transparency in the youth phase. Now I would like to discuss the governance and delivery mechanism for the people, which is one of the requirements of the democratic system.

As a part of governance, the Government needs to provide multiple facilities and services to the people. Also, these services are required to be constantly upgraded with the use of technology for fulfilling the aspirations of the people. The Government budgets and expends a large amount of funds for fulfilling this goal. The money for the work comes from people through taxes. It is the money collected from the people, which is being spent for the benefit of all the people and particularly the needy. However, when it comes to reaching of the benefits to the common man, the value of the services, which reaches the citizen, is much below the expected level of satisfaction. This happens in all the services namely education, health care, sanitation, water, power, road, drainage, tele-communication, seeking of loans from the banks for agriculture and small-scale industries and many other areas of societal importance. Even to make the timely payment for certain services the citizens have to struggle and sometimes pay bribes to make the payment.

The Government is responsible for bringing the smiles on the faces of billion people by enacting appropriate policies, laws and facilitating societal transformation. Management style varies naturally

with the policies and procedures, which are mostly based on mistrust and distrust. As a result, motivation and empowerment, at the implementation levels, are dampened and suppressed, whereas Indian people have shown enormous resilience and have achieved phenomenal success when provided with an environment of trust and confidence in the working space. Whenever there has been a programme run on mission mode through a specially conceived management structure we have been realizing very satisfactory results whether in government, quasi-government or private. We have examples that even for governance-related items there are models where a focused mission mode operation has helped. Recently, we saw such a mission mode operation. Now, let us look at our national challenges.

Our nation is going through a major challenge of uplifting of 260 million people who are below the poverty line. They need habitat, they need food, they need health care, and they need education and employment finally resulting in a good life. Our GDP is growing at more than 7% per annum, whereas, the economists suggest that to uplift the people below poverty line, our economy has to grow at the rate of 10% per annum consistently, for over a decade.

To meet the needs of one billion people whose number will further increase, we have a mission of transforming India into a developed nation. We have identified five areas where India has core competencies for integrated action: (1) Agriculture and food processing, (2) Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country, (3) Education and Health care, (4) Information and Communication Technology, and (5) Strategic sectors. These five areas are closely inter-related and when effectively addressed, would lead to food, economic, energy and national security.

For implementation of these programmes in an integrated way and in a time-bound manner in a cost-effective fashion and also to provide the necessary services to the citizens equitably with ease, it is essential that we use the technologies available today and work out a comprehensive e-governance system for all government to government and government to citizens transactions.

Indian democracy has been functioning effectively for the last six decades. In a vibrant democracy we have accomplished many successful missions by many governments. We have brought down the poverty level to 26% with the growing population and today India is one of the emerging strong economies of the world because of our limited opening up of our economy in the post 1991 period. However, our growth rate is slow. The causes attributed for this slow growth rate are the administrative system, large accumulation of pending cases in our courts, the number of controls exercised by the administrative system and the government running many of economic activities rather than opening it up to the specialists in a competitive environment. In spite of these severe constraints, our youth have excelled in knowledge domain and have shown a phenomenal growth in ICT sector employing over one million people and have achieved the revenue target of \$28 billion in 2004. In the same way, service sector has achieved 7.6% of annual growth for the last decade whereas agriculture and manufacturing sector have shown slow growth rate. This gives us an idea that wherever there is an independence to perform we have performed well whereas wherever we have created large amount of dependency through complex policies, procedures and subsidies, our performance has been stunted and transparency diminishes. There is a need to introspect on this dependency syndrome, which we have created. We need to remove these dependencies systematically and allow the people to perform in a competitive environment in the global market. This will involve re-formulation of policies and procedures prevalent in the legislature, executive and judiciary keeping in mind the changing scenario of the world, challenges to be faced by the economic sector in the global competitive environment and meeting the aspirations of the people in providing a higher quality of life. All Government programmes must consider citizen as a privileged customer and become accountable for providing all the services needed by him without interruption and hassles. One of the means by which this can be ensured is the incorporation of a sound e-governance system in all the three pillars of democracy. Keeping this aspect in mind, I would like to share the thoughts on implementation of e-Governance system for providing transparent administration.

Good governance is being recognized as an important goal by many countries across the world. They have taken up specific initiatives for open government. Freedom of information is being redefined and supported by detailed guidelines. The Internet revolution has proved to be a powerful tool for good governance initiatives and the world is moving towards Internet governance. An important dimension of the Internet potential is the possibility of providing services any time anywhere. Along with this there is a conscious effort to put the citizen as the centre of focus of the governance. Citizens are being perceived as customers and clients. E-governance has to be citizen-friendly. Delivery of services to citizens is considered as a primary function of the government. Particularly in a democratic nation of a billion people like India, e-Governance should enable seamless access to information and seamless flow of information across the state and central government in the federal set-up.

I visualize an election scenario, where a candidate files his nomination from a particular constituency. Immediately the election officer verifies his/her authenticity from the national citizen ID database through multifactor authentication, through a multipurpose Citizen ID card. His education credentials come from the school or university records. His track record of employment comes from various employers with whom he had worked. His income and wealth resources come from the income-tax department, and other sources. His property record comes from the registration of land authority across the country. His credit history comes from various credit institutions like banks. His/her civic consciousness and citizenship behaviour comes from the police crime record. His legal track records come from the judicial system.

All the details arrive at the computer terminal of the election officer within a few seconds automatically by the act of e-Governance software agent which crawls across the various state and central government web services directories through the network GRID and collects the information automatically and presents the facts in real-time without any bias. Artificial intelligence software analyses his

credentials and gives a rating on how successful he will be as a politician. Election officer sitting at the remote block of the country decides on the spot and the election process starts. All the voters vote from their home through virtual polling booths. Is it a dream? Is it possible? If possible, when shall we have it? Can we provide good governance to our one billion people? Can the governance speed up the delivery system? Can the governance differentiate between genuine transactions and spurious transactions ? Can the governance ensure immediate action for the genuine cases, which satisfy the checklist for a particular service and keep pending, the action on spurious transactions? Can this be done by e-governance at a cost affordable by our nation? If we have this system implemented then I can call this as an ideal example of the effective e-governance system for the citizen. E-governance system is a means to an end. We need enlightened citizens to realize the full benefits of the e-governance systems. It is people who finally uphold ethics, morality and righteousness.

Now I would like to discuss some of the good practices followed in the three pillars of our democracy.

The passing of the Right to Information Act 2005, Right to Education Act, and the National Rural Employment Guarantee Act 2005 are some of the recent examples of the effective functioning of legislative system. These Acts are structured to fulfil the aspirations of our citizens particularly the poor.

Some of the key accomplishments of the executive have been the time bound realization of the metro railway system in Delhi, limited e-governance implementation in certain States like Kerala, Gujarat and Andhra Pradesh bringing about substantial transparency in the provision of government to citizen services. A working validated model of railway reservation system, virtual university initiative of the three old universities of the country namely Madras, Calcutta and Mumbai and the health care services of the Karnataka Government through Yeshaswini scheme are the other notable accomplishments of the executive which have positive impact on large number of citizens of the country.

There is a model available in Karnataka, where the Lokayukta has become pro-active in unearthing corruption and irregularities in various Government departments. Having the same powers as his counterparts in other States, he visits offices and hospitals to personally check on cases of irregularities and corruption. Due to the proactive action, I understand that Lokayukta has been able to unearth property worth Rs.250 Crores which was amassed disproportionate to known sources of income.

The judgments of the Supreme Court and some High Courts are now available in the Internet. This step has considerably relieved the agony of the litigants and also enables others to use these judgments in their areas of interest. It is a giant leap. It is essential that all other Courts in the country also follow this model and that has to be enforced by the Law Ministry, State Govt and the higher judiciary. In addition to this, for example, the landmark judgment on the use of CNG and interlinking of rivers has large impact on the welfare of the society such as elimination of pollution in big cities and mitigating the miseries of the people from the flood and drought.

Let me now describe my personal experience in setting up and operating a typical e-governance portal established at Rashtrapati Bhavan. Rashtrapati Bhavan has introduced connectivity with our citizens, institutions, universities, government departments and multi-lateral agencies during the last three years. For enabling such connectivity, all the important events in which the President participates are brought out in the website (www.presidentofindia.nic.in) as soon as the functions are over. Today, on an average, this website has a hit rate of over 250,000 per day. On certain special occasions like Independence Day, Republic Day, it touches nearly a million hits. In addition, I receive over 500 e-mails and 500 letters on an average from various people from all over the country and abroad. I also receive hundreds of questions from the students and children every day. We have built in an e-governance system to study all the correspondence on a day to day basis, analyze, prioritize, verify and determine the action requirements to be taken by Rashtrapati Bhavan and other agencies of government and the relevant institutions both

public and private. We have now established a near paperless dynamic and secured workflow system for the file movements. All the officers in Rashtrapati Bhavan are being connected through Wi-Max. We have a Fibre broad band POP (Point of Presence) that can connect up to 64 Mbps. We have established within Rashtrapati Bhavan facilities for G2G and G2C connectivity and we are in the process of establishing the high bandwidth broadband VPN connectivity with Central and State Governments and other relevant institutions for seamless flow of information within the existing systems and procedures of Governmental functioning. This is called the e-Governance GRID. We will soon have all the transactions between Rashtrapati Bhavan and various ministries, Central and State governments through this e-Governance GRID. Similarly, Central Governments and State government should establish the e-Governance GRID at state, district, block and village levels. This will ensure the transparency in the administrative delivery system and enable provision of quality service to the citizens.

- (a) Services like police, land administration, judiciary (lower courts), municipal services and income tax have been found to be the key problem areas by the Transparency International India. There is a need to train the personnel working in these services about the importance of providing hassle free services to the citizens. They should be specially trained to be citizen-friendly. Personnel working in these departments must be provided with reasonable housing and transportation facilities including empowerment in their task. They should become accountable for the services to be provided to the citizens and also be penalized for wrong decision. We can also consider training the personnel at the grass root level in foreign countries so that they can get a first hand feel of how these services are being provided in different countries. These measures will improve the quality of services being provided to the citizens and the perception about these departments. Bureaucrats should become facilitators rather than officers.

- (b) The following are the components that influence transparent society: Corruption detection, fast police action, court proceedings with minimal adjournments, fast judgments and right to appeal restricted to a minimum level and also there must be provision for punishing the biased allegation bringing the accountability into the system. All these processes should be completed within a prescribed timeframe and all the pending cases in the court particularly pertaining to corruption should be cleared in a time-bound manner using a special tribunal.

Conscience is the light of the Soul that burns within the chambers of our psychological heart. It is as real as life is. It raises the voice in protest whenever anything is thought of or done contrary to righteousness. Conscience is a form of truth that has been transferred through our genetic stock in the form of the knowledge of our own acts and feelings as right or wrong.

A virtuous and courageous person can alone use the instrument of conscience. He or she can alone hear the inner voice of the soul clearly. In a wicked person this faculty is dead. The sensitive nature of his / her conscience has been destroyed by sin or corruption. Hence he or she is unable to discriminate right from wrong. Those who are leading organizations, business enterprises, institutions and governments should develop this virtue of the ability to use their own conscience. This wisdom of using the clean conscience will enable them to enjoy the freedom and remove their anxiety and worries. In this connection, I would like to recall the hymn that I have heard in a spiritual centre. It reads as follows:

Where there is righteousness in the heart,
There is beauty in the character.
When there is beauty in the character,
There is harmony in the home.
When there is harmony in the home,
There is order in the nation.
When there is order in the nation,
There is peace in the world.

It is a beautiful connectivity between heart, character, home, nation and the world. In a society we have to build righteousness among all its constituents. For the society as a whole to be righteous we need creation of righteousness in family, righteousness in education, righteousness in service, righteousness in career, righteousness in business and industry, righteousness in civil administration, righteousness in politics, righteousness in government, righteousness in law and order, and righteousness in justice.

Friends, the report of Transparency International India indicates the level of missing transparency in various transactions. I have answered how we can evolve an enlightened citizen from a child to grown-up and an organisation, who will eventually be an instrument of transparency.

My best wishes for success in your deliberations in the mission of helping the society to have good citizens.

2

Economic Affairs

Tourism Industry – Prospect for Wealth Generation

I AM HAPPY to participate in the inauguration of Seminar on Tourism organized by the Gujarat State Government. My greetings to the organizers, tourist operators, government functionaries, infrastructure developers other participants and distinguished guests.

In India we celebrate a number of festivals. This is our cultural tradition. Maharashtra celebrates Ganesh Chaturthi, Bengal, Karnataka and Gujarat celebrates the Navarathri, Kerala celebrates Onam, Tamil Nadu celebrates Pongal, Andhra Pradesh celebrates Ugadi, UP celebrates Ramanavami and Krishna Ashtami, Kashmir celebrates Urs (or Ziarats), Navroz etc. These are some of the examples. Each state and region has some unique festival which is popular among the people. Celebration of these festivals is followed by a number of cultural events which attracts the attention of all the people, especially the Navrathri celebrations in Gujarat is accompanied by a carnival of nine nights involving garba folk dance with devotion and colour. This is celebrated at the best time of the year. Along with the dance the festival involves music, colourful costumes and is participated by all sections of the society. There are large number of Gujaratis staying in different parts of the world. I am sure the diaspora would definitely like to visit their home state during this festival season.

I would like to share with you my recent experience, when I visited Tanzania and South Africa. I started from New Delhi on 11th September 2004 and flew to Dar-es-salam, capital of Tanzania via Mumbai. When I crossed Mumbai, I just saw, what a beautiful scene, the waves of Indian Ocean hitting the shores of Mumbai. After five hours of flight from our soil, I reached Dar-es-salam. Again from air, I could see the waves of same Indian Ocean embracing Dar-es-salam. I could see Indian Ocean unifying both the countries. This was further reinforced, when

I went to Zanzibar Island. I saw in their museum, a multi-sails boat which was used by our ancestors from Gujarat who were first to arrive in Zanzibar and enriching that Island. Their arrival is mentioned in the Zanzibar records. When I met the Zanzibar citizens, I found in them a mini Gujarat, what a beautiful meet it was ! I had a similar beautiful experience in Dar-es-Salaam also.

When I think of 20 million people of Indian origin spread in various countries of our planet, I am reminded of a poem in Tamil epic *Purananooru* composed three thousand year ago.

“யாதும் ஊரே யாவரும் கேளிர்”

It means, “All places are our native places and all people our relatives”. This is deeply ingrained in the social and political life of India for thousands of years. The message, I would like to convey is that the tourism is multi-dimensional.

With vast civilisational heritage of the country, from the Himalayas to Kanyakumari, J&K, Central India, North Eastern states, Bihar, Western States, the large coastal line, Andaman Nicobar and Lakshadeep Islands have a lot to attract the tourists. The major tourist attraction could be spiritual tourism, medical tourism, eco-tourism and the festival tourism. After my visit to almost all the regions of the country, I have realized that the tourism industry has a tremendous potential for wealth generation and should operate as a mission with higher targets. To succeed in this mission the infrastructural requirements are very essential and are to be improved. Thrust is required to be given for the inland water navigation, hotels, communication and tourist promotion. If we promote sustainable tourism, it can definitely become India's core competence. These mission areas need action and will provide the multiplier effect and give the necessary momentum to all sectors of the economy.

I was analyzing the market share of tourism industry in different countries. France tops the list with a share of 11%, followed by 7.4% in Spain, 6% in USA, 5.7% in Italy, 5.2% in China, 3.4% in UK 2.9% in Canada, 2.8% in Mexico and 2.6% in Austria and Germany each. Surprisingly we do not figure in the list of top 30 countries. What is

required by a modern tourist is good and comfortable travel conditions, clean reasonable accommodation, and healthy environment, friendliness of the tour operators, vendors, societal harmony and his safety. Last year when I was in Dubai, I met the Ruler of Dubai. He said that Dubai is planning to increase the tourist arrival by five times. Once this decision was taken I found, that the aviation minister was planning for a new airport and also new types of aircraft needed for attracting the tourists. The surface transport minister was planning a number of additional lanes required in the highways. The works ministry was planning for increase in the hotel accommodation for accommodating the tourists without disappointment. The health ministry had a road map for waste management, additional clean water need. This was the type of integrated response that I found in the whole government to fulfill the national objective. We have to take the message coming out of this experience and plan for the multiple requirements simultaneously for promoting tourism in our country.

The status of environmental cleanliness is one of the indicators of development of a nation. As a nation, we have to keep our environment clean and tidy. This is essential for better health conditions of all the citizens and also for presenting a wholesome and aesthetic atmosphere for us and also the tourists visiting our country. It is essential that we keep all our places of worship and rivers clean and tidy to preserve their innate divinity. Each one of the States may promulgate appropriate local laws for promoting harmonious environment in their regions. This will be the first step needed to promote tourism in our country. Here I would like to share with you the experience of Kali-Bein River in Punjab cleaning operation.

The place where Gurunanak Dev is said to have received enlightenment and which had over the centuries turned literally into a sewage ridden, weed choked drain, is today flowing clean and proud due mainly to the efforts of Baba Balbir Singh Seechewal in partnership with the Punjab State Government. From the discussions, I understand that he organized people's participation in stopping the massive flow of sewage into the Bein and cleaned 160 km long polluted and choked rivulet within the last three and a half years by deploying on an average 3000 volunteer workers per day. Today one can feel the flow of fresh water in this rivulet released from the Tarkina Barrage by the government

about a year ago. The revival of the rivulet has recharged the water table as the hand pumps that had become dry for the past 4 decades are now pumping out water. Baba not only did the cleaning up operation by clearing Bein from the weeds and hyacinth, but also built bathing ghats at five places. He also built more than 100 km long kutchra road on the bank of the rivulet.

While I was thinking how we should solve the problem of improving the environment of rivers and religious places, I find one of our enlightened citizens has taken the initiative and demonstrated the power of ignited individuals to solve societal problem. Let this model spread in all the places of divine worship and inspire the pilgrims to participate in the divine task of clean environment in water and air which will attract large number of tourists into our tourist destination. “Thousands of local initiatives will definitely make our country an attractive place”.

When the tourist comes to India he would like to realize maximum value for the duration of his stay which can come only through reliable and fast travel conditions. Many of our tourist spots are located in interior areas which involves travel by road. To enable fast travel what we need is air connectivity to majority of the places. Complimentary to the air travel we can also plan fast train services like Shatabdi express. Creation of these facilities will involve infrastructural development such as airports, railway line and multi lane roads to interior India. The road connectivity can be linked with the PURA (Providing Urban Amenities in Rural Areas) programme. In addition to this we can also think in terms of inland waterways which can attract certain class of people. This mission has to be accomplished through government-private partnership.

Many of our cities do not have continuous availability of power. This gap has to be bridged through use of adding generating capacity using solar power and power produced out of municipal waste. I should also point out that actions do not stop at increasing generation alone. It has to be of good quality. No voltage fluctuation or frequency variations should be there. In addition, transmission and distribution has to be efficient with low loss. Above all at the consumer end energy efficiency should be the key word. We generate power for good use and not to be wasted as useless heat or sound. The lesser we use energy more kind

we are with the environment. Therefore, for each watt used we should get maximum end use. Providing quality, reliable and uninterrupted power is essential for providing minimum comforts to our tourists.

Another important infrastructural need is quality clean accommodation. Private/public sector participation should plan adequate number of hotel rooms with various amenities at different tourist centers. The accommodation apart from being central in location should also provide a good environment to attract the tourists. Communication facilities in the accommodation should be such that the guests should feel that he is in touch with the outside world. Recently, during my visit to South Africa, I found that each room had a e-connectivity through which the Hotel was in touch with the guests. The guests can also send messages to any part of the world. Also the hotel must be able to provide all the information needed by the guests to plan his visits within his prescribed budget and also available time. In addition the hotel authorities must ensure safety and security of the guests including their belongings. It is also essential to provide the type of food which the tourists normally prefer in their country.

Tourists must be made to feel at home in our country. They generally come in contact with taxi drivers, airline staff, railway staff, shopkeepers, tourist guides, hotel staff and the response from these people becomes a bench mark for the tourists. Hence, it is essential that all the people whom a normal tourist is likely to come in contact should be trained in the way they should interact with the tourists. They should ensure that the tourist get all support and he is made to feel fully at home. This is a vital requirement for attracting the tourist inflow into the country.

As tourism in India is increasing, people from foreign countries are coming to India and Indians also love tourism and visit number of countries. I would suggest, just like spiritual tourism within our country, we can consider promotion of multi-national spiritual tourism connecting important Buddhist centers in India, Nepal and Thailand operated by a single air-line.

Gujarat has many interesting places which can become a good tourist destination. Some of them are the ancient remains of Indus valley civilization at Dhola Vira in Kutch district, the desert lands of Kutch,

the only abode of ancient lion Gir forests, sanctuaries of rare species of birds and animals, beaches along the sea coast, Lord Krishna's temple at Dwaraka, Jain Temple at Palitana. I am sure these places can be definitely converted as exciting tourist spots which will attract both national and international tourists. The tourist inflow during the Navarathri season will get enhanced due to the cultural value of variety of dances presented by the locals.

Dignified human life is characterized by probity in every facet. Irrespective of one's station in life whether in politics, civil services, social work or any other one is expected to conduct oneself in a civilized manner. Everyone is entitled to self-respect, and showing due respect to others is the only way to earn that self-respect. This is very much applicable to all the tourists whom we receive. Let us set standards for ourselves in keeping with our hallowed past and glorious traditions. All of us must realize the nation is bigger than any individual. With this thought in mind we should treat each tourist as our personal guest which in my view is the only way to attract tourists from all parts of the world to our noble land. *Atithi Devo Bhava* that is our culture.

Women Empowerment for a Stable Society

I AM INDEED delighted to address and interact with the women entrepreneurs of Karnataka organized by the Association of Women Entrepreneurs of Karnataka. My greetings to all the members of AWAKE for the good work they are doing for the women community. I would like to share some of my thoughts with you.

The heart of India lies in its villages, as there are approximately 6,00,000 villages in our country and around 70% of our population reside in the villages. Hence the villages have to play a crucial role in bringing about overall development in the country. The next two decades are very important for India for transforming from a ‘developing’ country to a ‘developed’ nation. The responsible citizens, particularly women, are all the more important for the nation as their thoughts, the way of working and value system will lead to fast development of a good family, good society and ultimately a good nation.

The nation has a vision for the India of 2020 and by that year we hope that India can join the ranks of developed countries. For this, we would have to double our present growth rate of Gross Domestic Product, and to achieve this, five key areas have been identified in which we need to focus our attention. These areas are:

- (1) Education and Health care,
- (2) Agriculture and Food Processing,
- (3) Information and communication technology,
- (4) Infrastructure development, and
- (5) Self-sufficiency in areas of critical technologies.

I have a message for all the women entrepreneurs who are gathered here today. In all these five areas, which have been listed for focused attention, the role of women is very clearly interwoven. For example, in areas of health care, education, agriculture and food processing, it is the women who provide a major portion of the services, which go into these sectors. As such, your role in shaping the future destiny of our country is very very important. You must dream and think about how to make our nation join the ranks of the developed nations by 2020.

To achieve this vision, I would like to share with you some thoughts on possible missions. For bridging the rural-urban divide and achieving balanced socio-economic development, our Pradhan Mantriji, as part of his Independence Day announcements, has declared the Rural Development Programme called PURA - Provision of Urban Amenities in Rural Areas. It involves identification of rural clusters with growth potential and creating four types of connectivities for them -

- (i) Road, transportation and power connectivity,
- (ii) Electronic connectivity in the form of reliable telecom, Internet and IT services,
- (iii) Knowledge connectivity in the form of good educational and training institutions, and
- (iv) Market connectivity that would enable kisans and others to get the best prices for their produce.

The Government has decided to implement the PURA strategy in 5,000 rural clusters across the country in the next five years. But the success of this ambitious programme lies in the collaborative efforts and active participation of all the village leaders at the grassroot levels. Moreover, a woman with her inherent characteristics such as compassion, patience, perseverance, honesty, sensitivity to social issues, constructive approach towards problem solving and hard work, will be able to play a vital role in realising this mission. Such women, when empowered through the democratic process, can collectively produce spectacular results.

I am reminded of Mahakavi Subramaniya Bharatiar, who in 1910 composed the poem envisioning women of India:

This beautiful poem means -

She walks with raised head,
With her eyes looking straight,
She has her principles,
Unafraid of anybody!

She has a lofty
And knowledge-based pride,
Such cultured women,
Don't falter from the chosen path.

She drives ignorance away.
She welcomes the bliss of life
With learned mind.
This is the Dharma of emerging woman.

The dream of the poet, I am sure, will become a reality.

The women entrepreneurs can create awareness about PURA amongst the village community so that they can come forward to willingly contribute to this development programme. The contribution could be in the form of -

- (a) Promoting and facilitating illiteracy eradication campaigns in the village.
- (b) Explaining the usefulness of computer education in village administration for providing transparent governance and economic advancement.
- (c) Forming village co-operatives for central procurement, storage, preservation, processing and marketing the goods at attractive prices.
- (d) Working for providing better nutrition, sanitation facilities, safe drinking water and access to reproductive health care for healthy families and communities.

- (e) Fighting against the social evils such as dowry, female foeticide, child marriage, child labour, domestic violence, and ill-treatment and harassment of the socially backward classes.
- (f) Encouraging women to attain economic independence through formation of Self Help Groups with the help of micro-credit and organising various skill training programmes.
- (g) Facilitating the conservation of energy through effective utilization of solar power, recycling the waste for energy generation and management of water through rainwater harvesting etc.

When a child is empowered by the parents at various phases of growth, the child gets transformed into a responsible citizen. When a teacher is empowered with knowledge and experience, good young human beings with value systems emerge. When an individual or a team is empowered with technology, transformation to higher potential for achievement is assured. When a leader of any village empowers his or her people, leaders are born who can change the nation in multiple areas. When women are empowered, society with stability gets assured. When the political leaders of the nation empower the people through visionary policies, the prosperity of the nation is certain. When religions are empowered and become spiritual force, peace and happiness will blossom in people's heart. Empowerment of various layers of management structure is indeed the best instrument to maximize the performance of a given fund to the developmental tasks. Such an empowered stage will lead to creation of enlightened citizens with value system resulting in prosperity of the nation.

As per the Census of 2001, women account for 48.3% of our total population. Many agencies, both Government and private, are taking initiatives in the areas of training and capacity building, employment and income generation, welfare and gender sensitization with the ultimate objective of empowering women both economically and socially for making them equal partners in development. We had declared the year 2001 as 'Women's Empowerment Year' and efforts were made at various levels in many sectors for mainstreaming gender

perspectives into all laws, policies, programmes, regulations and budgeting allocations of the Government.

The process for transforming India into a developed nation has already commenced. All of you are working towards this cause in your own way. We find many individual success stories of women for income generation in the fields of agriculture, agro-processing, cottage industry, handicrafts, sericulture, herbal farming etc. Women are also leading movements against social evils with certain amount of success. Now there is a need to make concerted efforts as a nation to work persistently towards the singular goal of making India a developed nation by the year 2020.

For this, I suggest small groups of interested women entrepreneurs and public leaders from other States to have a workshop in the Entrepreneur Development Institute to see for themselves what can be achieved by way of gender empowerment through efforts like the one made by AWAKE. I am sure this would enlighten women entrepreneurs of other States as well and encourage them to take on efforts like the one which we have seen here.

Keeping the Environment Clean

I AM DELIGHTED to participate in the inauguration of India Country-level Development Marketplace organized by the World Bank. My interest to participate in this meet arises from the focus of the programme towards sustainable rural development in India.

What am I doing in this function organized by the World Bank? That too on a beautiful Monday evening? I am here to share with you an important message. A message that will make the partnership between the World Bank and countries like India lead to a path of win-win relationship. While we all appreciate your efforts of selecting and funding 20 innovative projects, let us spend a minute to see how we can benefit from the experience. The experiences of such small but important projects can be integrated and scaled up, so that it will give certain inputs to the overall mission of India as presented in my recent Parliament address to bring prosperity to the rural India. This definitely has a tremendous scope for the World Bank to become a partner in this national endeavour. There is an old Indian saying that “Only a burning candle can light another”. Let the candle of knowledge that you light from your experience here, be propagated to the rest of the needy world, so that we would soon witness a prosperous borderless planet.

World Bank has taken an important initiative in calling for proposals from over 1500 Non-Government Organisations in India for rural development programmes, which I am sure will have an integrating effort and may pave the way in choices of multiple routes towards rural development. I congratulate the organizers for promoting this programme. My greetings to all the participants who have submitted the proposals, award winners, juries, experts and distinguished guests.

When I was going through the 50 short-listed proposals, I found that each one of these tiny but important projects addresses a specific issue and these are widely spread across the nation. If the social entrepreneurs with the participation of panchayat and local administration successfully demonstrate these projects then they have the potential of being assembled as components of a holistic project in a village cluster.

The World Bank efforts of inviting the proposals, systematic screening and selection through eminent juries, are noteworthy. The twenty selected proposals by the World Bank will complement the integrated rural development programme of the government. Hopefully these twenty projects may turn out to be demonstrative of innovative ideas, which can be replicated elsewhere.

Now I would like to share with you some recent case studies to illustrate how these individual sectoral innovations could lead to an integrated rural development model.

Recently I had visited Periyar Maniammai College of Technology for women and inaugurated a project called PURA (Providing Urban amenities in Rural Areas) Complex. Over 60 villages near Vallam, Thanjavur district of Tamil Nadu, have been transformed as a PURA Cluster. It has a ring road and interconnecting roads covering major villages along with bus transport system. They have provided internet kiosks through wireless connectivity for many of the villages. Periyar Maniammai hospitals and family welfare centres along with the mobile cancer diagnostic clinic provides health care to the population of the rural complex. Campus provides education from kindergarten to postgraduation. In addition, they are providing knowledge connectivity through awareness and training programmes for use of organic manure (vermi compost), Yoga and Siddha-based formulations, renewable energy, rain water harvesting and general health. Women are empowered through Self-Help Groups, entrepreneurship development programmes including training programmes for skill development and micro business activities. Organizers of Periyar PURA have established so far 525 self-reliant Self Help Groups, which provide employment for 8000 rural women through products for which technologies have been

transferred. They are self-sufficient in energy through solar power and bio-mass gasifier plants. Towards economic development they have integrated farms, energy plantation, aquaculture, livestock farms and dry land horticulture. They have innovative water management schemes for irrigation. Provision of training to the village community in printing technologies, refrigeration and air conditioning, hardware training, Desk Top Publishing (DTP), plumbing, electrical wiring, welding/fabrication, bakery and construction technology has created job opportunities to the villagers. The members of the villages are fruitfully employed and they are producing value added products. A transformation has taken place keeping our civilizational heritage intact and converted the rural settings into a livable habitat. I have witnessed the progress of this project.

BAIF (Bharat Agro Industries Foundation, Pune) has organized a tribal rehabilitation programme for sustainable livelihood. The tribal population in Vansda (Navsari district) and Dharampur (Valsad district) blocks of Gujarat were migrating to nearby cities with their families in search of wages as their land holdings were very small and the crop productivity was low. Migration deprived the children of educational and health facilities, while both men and women took to drinking of alcohol. These families were motivated to stay back on their own lands and take up cultivation of fruit bearing trees as a measure of generating gainful employment. BAIF provided wages to the families in the formative stages for working on their own lands, as they had no other source of income. They were enabled to grow good quality grafted plants of mango and cashew and also provided with manure and fertilizers. In return, BAIF took a commitment from the families that they would work hard and abstain from alcohol and other addictions.

Simultaneously, the men and women were organized into small Self Help Groups to meet every week and discuss various actions to be initiated under this programme. Watershed development programme was introduced to harvest the rainwater near the fruit gardens (known as Wadi in Gujarat) for providing support irrigation. As sophisticated drip irrigation system was not manageable due to lack of electricity and high cost, pitcher irrigation was promoted. After establishing the

fruit trees, the farmers were advised to cultivate various food crops. As the fruit trees started yielding after 3-4 years, other income generation activities such as establishment of fruit nursery, cultivation of vegetables and herbal medicines, sericulture, mushroom production, masonry and carpentry were promoted to generate additional income. Thus, they attained food security right from the first year while the trees started growing and bearing fruits from the third or fourth year, generating a surplus of Rs. 20,000-25,000 per family.

It is the tribal women who were more interested in attending to the field activities and nurturing the orchards. Drudgery reduction and health care were also promoted and the women were able to utilize the time saved for productive work. Today, they have formulated their own co-operatives for processing and marketing of their cashew and mango products and for this advance facility centres have been established for each zone.

This programme has benefited over 50,000 tribal families in Gujarat, Maharashtra, Karnataka and Rajasthan. As the orchard is able to give them substantial income, they have stopped migrating to the cities. These tribals who have established fruit orchards on their degraded lands have not only come out of poverty, but also protected the neighbouring forest area and demonstrated how poverty eradication can be linked with eco-system improvement. Today, this programme has emerged as a unique tribal development model in the country.

BAIF is also engaged in livestock development for promoting animal husbandry on a massive scale covering over 20,000 villages in 9 States. Over the last 35 years, they have helped over 7-8 lakh families to come out of poverty. Under this programme, BAIF provides breeding and advisory services to produce superior quality cattle. A family maintaining 2-3 crossbred cows, earns Rs.18,000-20,000 per year. This is the result of use of appropriate technologies and ambient management methods.

Project Siruthuli is an initiative started by Coimbatoreans for Coimbatoreans. This ecological project aims to bring back the glory of Coimbatore and its rich heritage. The project is represented by

people from all walks of life and professionally organized. The primary focus is on large scale rain water harvesting, afforestation, sewage/waste water treatment and solid waste management. They have already standardized five of the nine primary tanks in Coimbatore for large scale rainwater harvesting. Over 600 saplings have been planted on the bunds of the desilted tanks and are being maintained. They are moving towards a target of planting 15 lakh trees by the end of 2005. The comprehensive study has indicated outlet of the city sewage as 10 million litres per day. A pilot plant is being taken up for sewage treatment to treat one million litres per day. The treated water will be sold to the agriculturists and industrialists as a revenue earning measure. The garbage and debris to the extent of over 26,000 cubic metres in one of the city's largest tanks have been removed. These are the major achievements for developing a growing city.

The status of environmental cleanliness is one of the indicators of the development of a nation. As a nation, we have to keep our environment clean and tidy including all our places of worship and rivers. I am delighted to learn the Kali Bein rivulet, the place where Gurunanak Dev is said to have received enlightenment and which had over the centuries turned literally into a sewage-ridden, weed choked drain, is today flowing clean and proud, mainly due to the efforts of Baba Balbir Singh Seechewal in partnership with the Punjab State Government. From the discussions, I understand that he organized people's participation in stopping the massive flow of sewage into the Bein and cleaned 160 km long polluted and choked rivulet within the last three and a half years by deploying on an average per day 3000 devotees of the Gurudwara who have become volunteer workers for the mission. Today one can feel the flow of fresh water in this rivulet released from the Tarkina Barrage by the government about a year ago. The revival of the rivulet has recharged the water table as the hand pumps that had become dry for the past four decades are now pumping out water. Baba with the volunteers, not only did the cleaning up operation by clearing Bein from the weeds and hyacinth, but also built bathing ghats at five places. He also built more than 100 km long kutchra road on the bank of the rivulet.

Elango, a village Panchayat President, a Chemical Engineer, and a native of the village, pledged to develop Kuthampakkam. He decided to contribute for the village where he lived. In 1990, he gave up his job and started living in the village. Observing the poor living conditions of the people, Elango decided it was his first aim to retrieve people from illicit distillation activity. He then tried persuading them to take up alternative employment, planning some short term jobs for them, orientation programmes and a few more events, but all his efforts were unsuccessful. The people did not accept Elango, nor were they ready to recognize his efforts to improve their lives. All they wanted was a sustainable income. He came to the firm belief that organizing community employment for the people on a long-term basis was the only way to stop them from illicit distillation. He realized that neither preaching nor short-term benefits would attract them; only a steady income would. Elango was able to provide his villagers with sustainable employment through government schemes like the 'Namakku namae' project. "Under that project, he laid concrete roads with the members of village by dividing them into different groups and the project was handed over to them. One group bought material and another distributed it, while a third worked. Now the village has concrete roads for a stretch of more than four kms, without any compromise on quality. The project has not only provided alternative employment but also quality roads. Also about 900 families of Kuthampakkam under the low cost housing project have been transformed into an organized community with a harmonious eco-friendly lifestyle. Social tensions have disappeared. Every one in the village engages himself/herself in a constructive activity irrespective of age, gender or caste.

During my visits to various rural areas and interaction with people in different parts of the country, I come across a few unsung heroes appearing in the region who have done unique work for the village development. Some examples are agro forestry, self-help groups, and cultivation of bio-plants, increasing productivity of seed cotton, development of orchards, animal husbandry, tripling the yield of wheat and vermi-compost organic manure. A mechanism has to be evolved to spot the performance and build development around them. World Bank in partnership with Indian agencies can facilitate a special project

to conduct the survey of performers in different regions in the country and publish a directory. This information will be very useful to the Planning Commission, World Bank constituents, NGOs and State/Central government establishments.

So far, I have discussed with you some of the successful rural development initiatives undertaken by the NGO and individuals, apart from the Central and state governments' rural development programmes. Now I would like to discuss what is needed at this juncture. Nearly 700 million people of India live in the rural areas in 600,000 villages. Rural prosperity depends upon building up both "content" and "connectivity" simultaneously. Connectivity of village complexes providing economic opportunities to all segments of people is an urgent need to empower the rural sector. The essential needs of the villages today are water, power, road, sanitation, health care, education, transportation, communication and other services needed for sustainable entrepreneurship and quality of life.

The integrated methods, which will bring prosperity to rural India are: the physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through internet kiosks; knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes; and economic connectivity through starting of enterprises with the help of banks, micro credits and marketing the products.

The next two decades is a period of accelerated economic development for our country. Science and technology and economic planning has to contribute continuously for undertaking various missions. With these tasks before us, "What can I do for the prosperity of 700 million people living in six hundred thousand villages", should echo in the heart of every Indian scientist, technologist, economist and planner. And also the international organization definitely can use the experiences that will be gained from PURA, in other parts of the world since development is progressing in multiple ambient conditions. I am happy to see that the projects selected also address

the connectivity dimensions such as rural finance, energy, communication, e-services etc. A large number of projects fall in the category of knowledge connectivity. It would be appropriate as a next step of development financing that the World Bank can become partner in enabling the NGOs and corporate sector for undertaking development of viable clusters of villages for their sustainable development in a big way. The outlay of this participative endeavour would involve 20 to 40 million dollars for each cluster. Such investment, besides providing urban amenities in rural areas, will also become a sustainable business proposition. World Bank is not only a bank dealing with money, but also a bank that has become a creator and guardian of Knowledge Capital. This knowledge capital, a concept of banking in knowledge is the most ideal path for the world that is entering into the knowledge era. I am sure that whatever the World Bank gains by the experiments in India, will become a model for other countries to follow. This will make both the Bank and India feel satisfied. The banking sector in India and the postal department have a very strong presence in the rural India. They should work closely with the World Bank to propagate and democratize the knowledge and engage themselves in funding rural projects that would act as catalysts to lift the rural poor to afford and get the urban amenities without having to migrate to the urban India. My sincere request to the World Bank and the organizers of this event is for them to invest more time and efforts in making sure that the knowledge that the banks have accumulated should reach every needy Indian, particularly those in the rural areas. The Rural India should go next time to the bank not to borrow money but to borrow knowledge.

My greetings to all World Bank authorities and all the participants and the finalists of the village development programme.

Banking Sector – Reinforcing the Economy of the Nation

I AM DELIGHTED to participate in the Bankers' Conference 2004 hosted by Punjab National Bank and the Indian Banks' Association. My greetings to the organizers, senior bankers, economists, policy makers, academicians, government functionaries and distinguished guests.

In the Indian history, very rarely have we come across a situation, all at a time, an ascending economic trajectory, continuously rising foreign exchange reserve, global recognition of technological competence, energy of 540 million youth, umbilical connectivities of 20 million people of Indian origin in various parts of the planet, and the interest shown by many developed countries to invest in our engineers and scientists including setting up of new R&D centres. Also the national "Common Minimum Programme" of the Government has six basic principles. Three out of them emphasize on economic development by ensuring growth rate of 7% to 8% annually, enhancing the welfare of the farmers and workers and unleashing the creativity of the entrepreneurs, business persons, scientists, engineers and other productive forces of the society.

Now we have an important mission, the mission of lifting the economic status of 260 million people, who are below the poverty line. I understand that the total annual credit performance of our banks is nearly Rs. 800,000 crore (\$ 180 billion). In this environment, indeed Bankers have a mission of great challenge. I am sure the economic experts assembled here will be discussing the means of removing the poverty of 260 million people in a time bound manner. Our mission

is: Transforming India into a prosperous, happy, peaceful and safe nation, as our youth dream to have. Let me share with you a few thoughts.

It is well understood that sound fiscal and monetary policies, a trusted and efficient legal system, a stable set-up of democratic institutions and progress on social conditions contribute greatly to an economically healthy nation. Wealth is actually created at the micro economic level of the economy rooted in the sophistication of corporate and entrepreneurs as well as in quality of competitive micro economic business environment.

In this connection, I was studying the development patterns and the dynamics of connectivity between nations, especially in trade and business. As you all know the world has few developed countries and many developing countries. What is the dynamics between them and what connects them? Developed country has to market its products in a competitive way to different countries to remain as developed country. The developing country to get transformed into developed country too has to market its products to other countries in a competitive way. Competitiveness is the common factor between the two types of nations. Competitiveness has three dimensions: quality of the product, cost effectiveness and just in time in the market. Indeed this dynamics of competitiveness in marketing of products by developing and developed countries is called the “law of development”. Hence Indian products whether software or hardware has to compete within the country and in international markets.

In this context, banking sector has a tremendous role in reinforcing the economy of the nation, by servicing the micro economic needs of all the three sectors of the economy - agriculture, manufacturing and services, at the centres of action in the country.

The financial services industry has been in the vanguard in the development phase in all the countries. The proactive approach adopted by many banks has led to phenomenal growth of the country. The days of development financial institutions seem to be over. The current fashion is the Universal Bank. Even the redoubtable IDBI has converted

itself into a Universal Bank shedding the robe of a pure development financial institution. The development finance responsibility with its inherent risks is squarely and fully on the banking sector. It is in this background I wish the bankers to play a positive role to assist the country to march towards development faster.

In India we have the experience of providing venture capital to a number of entrepreneurs. Of course a few of them succeeded also. In the present economic situation, it is essential the venture capital business has to increase in magnitude, particularly with hassle free procedures. I have come across a European experience of a physics graduate turning into 100 million dollar exclusive venture capital banker and leading to establishment of a 10 billion dollar company. The chief executive of that company met me two days back with a certain dream for India.

Recently the Department of Science and Technology (DST) has started Technology Business Incubator (TBI) programme in a number of engineering colleges in the country to bring up young and innovative techno entrepreneurs to utilize the infrastructure and knowledge of academy to develop new products - software and hardware and establish design and process know-how for setting up a product line. The bankers have to scout for prospective entrepreneurs coming out of such programmes and provide venture capital to scale up and lead to quantity production. Actually in this situation there are certain risks. But in the history of great industrial development, risks always accompany success. If only you take such risks, you can reap the benefit of generating billion dollar company. Are you ready?

To achieve the vision of developed India, we have to simultaneously progress in five areas where India has core competence for integrated action: (1) Agriculture and food processing, (2) Education and health care, (3) Information and communication technology, (4) Infrastructure including electric power, networking of rivers, Providing Urban amenities in Rural Areas (PURA), and (5) Self reliance in identified critical technologies. These five areas are closely inter-related and if progressed in a mission mode will lead to food security, economic prosperity, social welfare and national security.

The number of PURA units for the whole country is estimated to be 7000. This envisages integrated connectivities to bring prosperity to rural India. These are - physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through Internet kiosks; and knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes. These three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing of the products.

Each PURA cluster will connect about 20 villages depending upon the region and population and will cost about Rs.100 crores. After initial short-term employment during construction etc., we have to plan for initiating actions for providing regular employment and self-employment opportunities in nationally competitive small enterprises in agro processing, manufacturing and services sectors for about 3,000 people. If the industrial/business parks are marketed well, they can generate employment opportunities in support sector for about 10,000 people. This will provide sustainable economy for the rural sector. In this national mission, bankers can promote entrepreneurship in the rural areas. This will lead to the removal of urban-rural divide.

A large number of banks have entrepreneurial development programmes. Banks have also been funding Small Scale Industries of different types in various regions. The small scale industrialist is a promising candidate for becoming the chief executive for managing the PURA complexes in an integrated way. PURA enterprises can also undertake management of schools, health care units, vocational training centres, chilling plants, silos and building a market, banking system and the regional business or industrial units. A new mission mode management style has to emerge for PURA enterprises. It should not be looking for protective legislations to support them. Rather they should be efficient to compete with others. This new PURA enterprise needs partnership from the bank, from the Government and also from the private entrepreneurs. Banks can train the entrepreneurs for managing

the PURA in their training centres and also provide them loans for creating and running PURAs as a business proposition.

In April 2004, a national meet on nano technology and its application was organized at Rashtrapati Bhavan. The present world market for nano materials, nano tools, nano devices and nano biotechnology put together is over hundred billion dollars. It has been noticed that the fastest growing area among these is nano-biotechnology. Health sector and industrial applications are priority areas for India. In this connection, I happened to study the Nano-technology Market and Company Report “Finding Hidden Pearls” supported by Deutsche Bank. The study provides the overview for the industrialists and the entrepreneurs to venture into the developing economy in a right path. It gives the following:

- (a) an up-to-date report on nano-technology companies and products that are already in the nano-technology market or will appear in the market soon.
- (b) identifies the key challenges and the time frame for future nano-technology products through expert interviews.
- (c) provides realistic market figures based on existing nano-technology products for various applications.

This report provides valuable inputs to venture capitalists, financial and economic analysts, consultants, marketing managers, R & D managers, researchers and vendors involved in nano-technology products. What I would like to emphasize here is that the initiative for the preparation of the report has emerged from the banking community. This shows how the banking community is forward looking and preparing the policy makers, scientists, researchers, industrialists and entrepreneurs to undertake different jobs connected with nano-technology products and services, the nano-technology market which is likely to reach \$ 1-2 trillion dollars by 2015 or more than 10% of the total global industrial output. I would suggest to Indian banking community to undertake such forward looking projects relevant to Indian environment in order to meet the international demand and come out with comprehensive reports and business proposals which

will provide different segments of society a clear direction for channelising their effort and investment leading to national prosperity. This indeed is a proactive action of the bankers.

Now I would like to discuss some of the large-scale employment and wealth generating avenues in the rural sector. These are not mere cottage industries but can become business of the size of thousands of crores of rupees.

- (a) **Jatropha Biofuel:** Government has decided to permit mixing of 10% bio-fuel with diesel. This has opened up new opportunities for employment and wealth generation. We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland have been allotted for tree plantation. Certain multi-purpose trees such as *Jatropha* can grow well in wasteland with very little input. Once grown the crop has fifty years of life. Fruiting can take place in this plant in less than two years. It yields oil seeds up to five tonnes per hectare per year and produces two tonnes of bio-diesel. Presently, the cost of bio-diesel through the plant is approximately Rs. 17 to Rs. 19 per litre which can be substantially reduced through choice of right size of the plant and using high yield variety plantation. Bio-diesel plants grown in 11 million hectares of land can yield a revenue of approximately Rs. 20,000 crore a year and provide employment to over 12 million people both for plantation and running of the extraction plants. This is a sustainable development process leading to large scale employment of rural manpower. Also, it will reduce the foreign exchange outflow paid for importing crude oil, the cost of which is continuously rising in the international market. Moreover, use of bio-diesel is carbon monoxide emission free. This oil can also be used for soap and candle industries. De-oiled cake is a raw material for composting. Also *Jatropha* plantation provides a good environment for honey production. We should absorb the best of technologies available worldwide and start commercial operation soon, instead of

staying at pilot plant levels. I would request the banking community assembled here to take the initiative, generate detailed project report in collaboration with technical agencies such as The Energy and Research Institute (TERI) on this project and promote entrepreneurs with financial support from the banks in rural areas who can undertake the plantation and commissioning of extraction plants leading to production of cost-effective bio-fuel. Can there be a better project than this for coherent development of our rural sector?

- (b) Rural Lighting: Recently, I received a E-mail from Chintapalli Gramam, Nalgonda District of Andhra Pradesh about the implementation of LED lighting through solar power in a remote village inhabited by Lambada tribes. The village has a population 142 people residing in thirty houses. The one time cost of providing LED lighting for all the houses including wiring and solar charging system for the battery is around Rs. 65,000. On an average, the cost of providing electricity per house works out to Rs. 2200. This is definitely much cheaper than the cost of providing electricity to the village through a power line running into number of kilometres costing many lakhs of rupees. Particularly in remote areas and hilly region electricity could not be reached due to high initial cost of installation. Presently I am told electric lines have not reached over one lakh villages in our country. LED power system is a self-contained system in which the energy cost is virtually free since solar energy is used to charge the batteries. I would recommend the banking community to study this project for converting it as a business proposition, which can be taken by rural enterprises for implementation in different sectors. Once successful this technology can find utility in many parts of the world where similar situation exists. This has tremendous business potential.
- (c) Electricity Generation through Municipal Waste: Increased urbanization has led to a serious problem of accumulation of municipal solid waste. Efficient and environmentally clean disposal of garbage has always been a major technological

challenge. While being a threat to the environment, mounting garbage is also a rich source of energy. The potential for converting this waste into useable energy, which will eliminate a major source of urban pollution, was realized by one of our innovative organizations — Technology Information Forecasting and Assessment Council of DST which helped in developing a completely indigenous solution for the processing of waste into a source of fuel. This fuel could, in turn, be used for generation of electricity through mini plants. Two entrepreneurs in Andhra Pradesh adopted the technology with refinement and established two independent plants in Hyderabad and Vijayawada generating over 12 megawatts of electricity which is being supplied to the State Grid. India needs thousands of mini power plants using municipal waste. Banking sector can provide the thrust for promoting creation of such power plants in major municipalities as a first step in collaboration with corporate houses and non-government organizations.

These are some of the examples of rural development projects which can be promoted by the banking community with the active participation of corporate houses and entrepreneurs for upliftment of the 700 million people living in our villages. There are similar possibilities in water, habitat, infrastructure, ICT, agriculture and many more. Once the banks get involved in all these sectors in a proactive manner, I am sure the path to development will be much smoother and our realization of development will be much faster.

An education loan scheme has been in operation for a long time; since April 2001 loans up to Rs.7.5 lakhs and Rs.15 lakhs are available for professional courses within the country and abroad, respectively. The requirement of collateral was dispensed with for loans up to Rs.4 lakh. Budget speech of the Finance Minister indicated that commercial banks have now agreed to waive the need for collateral for loans up to Rs.7.5 lakh, if a satisfactory guarantee is provided on behalf of the student. Thus, no student admitted to any professional course, including courses in IITs, IIMs, Engineering, Management and Medical colleges, will be deprived of the opportunity to study because of lack of funds.

In spite of this, I am receiving a number of e-mails stating that Banks are not providing the loans for professional education, even though they satisfy the required criteria. I would request the banking community to examine the merits of these observations and make appropriate corrections to the system. In addition to the above, another problem which I find is that there is no mechanism for funding other courses apart from professional courses which is also required for the holistic development of our nation. I would request the banking community assembled here to find a suitable mechanism for nurturing economically weaker section of our youth through financial support for pursuing higher education in all disciplines.

I understand there are 53,000 bank branches spread all over the country. I would recommend at least 10% of these branches namely 5,300 to adopt at least one primary and one secondary school each in their respective region of operation for improving the infrastructure and promoting quality education.

I would recommend the following six missions for the banking sector for immediate implementation:

- (a) Increase the agriculture and agro processing credit to Rs. 200,000 crore from the existing Rs. 90,000 crore within the next three years. This will include advances for setting up of PURA complexes and small enterprises in PURA clusters.
- (b) Create and nurture five rural development projects similar to bio-fuel project which can be applicable for a large number of villages leading to employment generation through enterprises for at least ten million youth.
- (c) Innovatively fund the 300,000 sick SSI units so that latest technology can be infused and they can overcome the present problems and become profitable ventures within the next three years.
- (d) Provide concessional interest rate funding for creation of corporate hospitals which can provide networked health care for the rural community through medical insurance on Yeshaswini model followed by Karnataka and also attract

medical tourists for cost-effective treatment through our quality doctors.

- (e) Participate in infrastructural development including provision of 100 million quality dwelling units with basic infrastructure in the rural areas in association with state urban development authorities.
- (f) Allocate at least Rs. 10,000 crore for providing venture capital to innovative scientists and technologists in all the three sectors, commencing from the next financial year, including Information and Communication Technology-based knowledge products and Software Development and Software Services.

In addition to the above missions, I have a suggestion. As you are aware, we have a growing foreign exchange reserve of about 120 billion dollars. The bankers can have a mission: how to invest and multiply a portion of FE reserve, if it is made available for investing in relatively higher yield enterprises.

Friends, so far I have discussed the dynamics of banking in relation to national development. In India we have two great resources — natural and human resources. Fortunately we have food security, certain industrial base and high-tech institutions. I believe what is needed today is proactive partnership of bankers in the national development missions. One of the very important ingredients for success of the vision of transforming India into a developed nation by 2020 is the evolution of creative leaders. Who is that creative leader? What are the qualities of a creative leader? The creative leadership is exercising the task to change the traditional role from commander to coach, manager to mentor, from director to delegator and from one who demands respect to one who facilitates self-respect. The higher the proportion of creative leaders in the banking sector, the higher the potential of success of vision of developed India.

My best wishes to the whole banking community for success in your two day deliberations, resulting in positive action plans for the growth of the banking sector and thereby the national development.

IITF – A Unique Blend of Trade and Tradition

I AM DELIGHTED to participate in the inauguration of the 24th India International Trade Fair - 2004. I greet the organizers, members of the Ministry of Commerce & Industry, members of the India Trade Promotion Organisation, captains of industries, contributors and participants from various nations for this mega event. I also extend my greetings to partner country China and focus country Brazil, for this trade fair. IITF is a unique blend of trade and tradition, and provides a platform for a wide range of industrial opportunities in various sectors of the economy by showcasing the nation's technological strength. This year's Trade Fair has the twin theme of "Agriculture" and "Information Technology" which are the key drivers of the India's socio-economic development. I have selected the topic for discussion: "Creating Brand Institutions".

During the last few years a number of developments have taken place in the agriculture and IT sectors with profound results in improving the productivity and quality of the products. I would like to share with you the status of development and focus for the future on the theme areas.

India is now producing 200 million tonnes of food grains, as a result of the first green revolution. India has now embarked on the Second Green Revolution which will enable increase in productivity and diversification of the agricultural sector. The second green revolution will have the farmers in focus, farming technology as the friend, food processing and marketing as partners and the consumers as the angels

to be satisfied. From now on to 2020, India will gradually increase the production to around 400 million tonnes of grains. The increase in the production will have to be done under the reduced availability of land from 170 million hectares to 100 million hectares with reduced water availability. We should also learn to diversify to meet specific consumer preferences, export markets and also in the interest of ecological balance. This is to be achieved through information access to all stakeholders and not with central controls or restriction of movements of agro products.

The challenges for the scientists and technologies would be in the areas of development of seeds that would ensure good yield even under constraints of water and land with ecologically balanced farming. The challenges for the scientist is indeed a knowledge graduation from characterization of soil to the matching of the seed with the composition of the fertilizer, water management and evolving new pre-harvesting techniques for such conditions. The domain of farming would enlarge from grain production to food processing and marketing. I visualize the trade fair showcasing the state of the art food processing industries for enabling the farmers and village enterprises to learn and produce products which are competitive in both national and international market. Another area where the trade fair can take a lead is to bring out the innovative technologies available in farm equipment relevant to Indian conditions. Newer forms of co-operative entities are required to be established for ensuring maximum benefit to the farmers. E-marketing concepts may also be put into practice to provide farmers choices in selling. Some of the areas which need focus are: soil upgradation, dry land agriculture, temperature and salinity resistant seeds and minimum water cultivation. There have been successful experiments carried out by TIFAC team in Bihar, where per hectare output of wheat has been tripled by farmers in collaboration with agricultural scientists through scientific methods. As a result, the earnings of the participating farmers have remarkably improved. Such experiments can be replicated in many parts of our country, carefully tailored to local conditions. This is a crucial socio-economic need.

ICT is a potent tool in various sectors of activities in public domain, and agriculture is no exception. Demand and supply monitoring of inputs, dissemination of technologies relevant to farming community through various organizations including universities, and making available marketing information at grass root level are some of the usages of ICT in agriculture. Covering each and every farm family through village Panchayat knowledge centres, internet and community radio should be the aim for greater usage of ICT. Successful models of effective communication to the farm community through the use of ICT accomplished in different states can be presented in the exhibition for emulation by farmers of different states.

The core competence of Indian IT industry has earned revenue of 15.9 billion in the year 2004-05 and targeted 20.5 billion in the next year. With the non-linear growth and value addition with innovations in the application areas such as information security, e-governance, embedded real time software, hardware and software integration, chip design, wireless, infotainment and tele-education, IT and communication industries in India should aim at higher growth rate to reach a target of 150 billion dollars business by the year 2010.

India has 700 million people living in 6,00,000 villages. Therefore rural sector is a big market. We need enterprises to service this need and generate large-scale employment. Entrepreneurs and captains of industries assembled here have a great business opportunity. I would like to discuss some of the large-scale employment and wealth generating avenues in the rural sector.

- (a) *Jatropha Biofuel*: Government has decided to permit mixing of 10% bio-fuel with diesel. This has opened up new opportunities for employment and wealth generation. We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland have been allotted for tree plantation. Certain multi-purpose trees such as *Jatropha* can grow well in wasteland with very little input. Once grown the crop has fifty years of life. Fruiting can take place in this plant in less than two years. It yields

oil seeds up to five tonnes per hectare per year and produces two tonnes of bio-diesel. Presently, the cost of bio-diesel through the plant is approximately Rs.17 to Rs.19 per litre which can be substantially reduced through choice of right size of the plant and using high yield variety plantation. Bio-diesel plants grown in 11 million hectares of land can yield a revenue of approximately Rs.20,000 crore a year and provide employment to over 12 million people both for plantation and running of the extraction plants. This is a sustainable development process leading to large-scale employment of rural manpower. Also, it will reduce the foreign exchange outflow paid for importing crude oil, the cost of which is continuously rising in the international market. Moreover, use of bio-diesel is carbon monoxide emission free. This oil can also be used for soap and candle industries. De-oiled cake is a raw material for composting. Also *Jatropha* plantation provides a good environment for honey production. We should absorb the best of technologies available worldwide and start commercial operation soon, instead of staying at pilot plant levels. I would request the industrial community assembled here to take the initiative, generate detailed project report in collaboration with technical agencies such as The Energy and Research Institute (TERI) on this project and promote entrepreneurs with financial support from the banks in rural areas who can undertake the plantation and commissioning of extraction plant leading to production of cost-effective bio-fuel. Can there be a better project than this for coherent development of our rural sector and sustainable business proposition for industry?

- (b) *Rural Lighting*: Recently, I received an e-mail from Chintapalli Gramam, Nalgonda District of Andhra Pradesh about the implementation of LED lighting through solar power in a remote village inhabited by Lambada tribes. The village has a population 142 people residing in thirty houses. The one time cost of providing LED lighting for all the

houses including wiring and solar charging system for the battery is around Rs.65,000. On an average, the cost of providing electricity per house works out to Rs.2200. This is definitely much cheaper than the cost of providing electricity to the village through a power line running into a number of kilometres costing many lakhs of rupees. Particularly in remote areas and hilly region electricity could not be reached due to high initial cost of installation. Presently I am told electric lines have not reached over one lakh villages in our country. LED power system is a self-contained system in which the energy cost is virtually free since solar energy is used to charge the batteries. I would recommend the industrial community to study this project for converting it as a business proposition, which can be taken by rural enterprises for implementation in different sectors. Once successful this technology can find utility in many parts of the world where similar situation exists. This has tremendous business potential.

- (c) *Electricity Generation through Municipal Waste*: Increased urbanization has led to a serious problem of accumulation of municipal solid waste. Efficient and environmentally clean disposal of garbage has always been a major technological challenge. While being a threat to the environment, mounting garbage is also a rich source of energy. The potential for converting this waste into useable energy, which will eliminate a major source of urban pollution, was realized by one of our innovative organizations — Technology Information Forecasting and Assessment Council of DST which helped in developing a completely indigenous solution for the processing of waste into a source of fuel. This fuel could, in turn, be used for generation of electricity through mini plants. Two entrepreneurs in Andhra Pradesh adopted the technology with refinement and established two independent plants in Hyderabad and Vijayawada generating over 12 megawatts of electricity which is being supplied to the State

Grid. India needs thousands of mini power plants using municipal waste. Industrial sector can provide the thrust for promoting creation of such power plants in major municipalities as a first step in collaboration with banks and non-governmental organizations.

These are some of the examples of rural development projects which can be promoted by the industry with the active participation of banks for upliftment of the 700 million people living in our villages. There are similar possibilities in water, habitat, infrastructure, ICT, agriculture and many more. Once the industries get committed in all these sectors in a proactive manner, I am sure the path to development will be much smoother and our realization of development will be much faster.

Business symbolizes competitiveness. Competitiveness leads to economic growth. Competitiveness is a single factor which will decide India transforming into a developed nation. Technology powers competitiveness. Competitiveness leads to creation of brand institution. IITF can be the unique window of knowledge for smart and intelligent minds to understand the strength of competitiveness. If we choose an integrated technology-driven path, then India will be in a position to become a developed nation by 2020. Some people tend to think of economy without the technology dimension. Therefore, their extrapolation will be linear. If we use the right technologies, we can bring in the right non-linear elements in all our sectors, viz. agriculture and agro processing, education and health care, infrastructure including water and power, information and communication technology and critical technologies in strategic sectors. Another factor which is very important for growth is that we should have synchronized and integrated growth in all sectors of the economy which is vital for making the impact of growth reach every section of the society.

I would like to request that Indian industries should learn to think big with the whole world as our market by developing a strong and interactive Technology- Market - Value Adding Competitive Linkage. It will be a great resurgence for our manufacturing, marketing, and

maintenance services. Indian industries should aim to become multi-nationals. Our youth love challenging jobs. We have to create challenging opportunities for them. We can WIN if we think we can win and act tenaciously with our clear goals in India to EXCEL IN A COMPETITIVE NEW WORLD AND CREATE INDIA BRAND.

I would like to compliment the India Trade Promotion Organisation, the organizers of IITF - 2004 for playing the role of catalysts and facilitators in increasing exports and giving impetus to intra-country trade. I declare the 24th India International Trade Fair - 2004 open.

My best wishes to both national and international participants for success in their business endeavours.

Second Green Revolution for Farmers

I AM DELIGHTED to participate in the inauguration of the symposium on Uncommon Opportunities: A Roadmap for Employment, Food and Global security organized by the International Commission for Peace and Food. My greetings to the organizers, planners, administrators, agricultural scientists, academicians and distinguished guests.

“Uncommon Opportunities: An agenda for Peace and Equitable Development” was published in the year 1994. After a decade plus, a new situation is emerging in the national scene of 2004. In the Indian history, very rarely have we come across a situation, all at a time, an ascending economic trajectory, continuously rising foreign exchange reserve, global recognition of technological competence, energy of 540 million youth, umbilical connectivities of 20 million people of Indian origin in various parts of the planet, and the interest shown by many developed countries to invest in our engineers and scientists including setting up of new R&D centres. Also the national “Common Minimum Programme” of the Government has six basic principles. Three out of them emphasize on economic development by ensuring growth rate of 7% to 8% annually, enhancing the welfare of the farmers and workers and unleashing the creativity of the entrepreneurs, business persons, scientists, engineers and other productive forces of the society.

As known to all the experts assembled here, India is now producing more than 200 million tonnes of food grains, as a result of the first green revolution piloted by the political leadership of Shri C. Subramaniam, the scientific leadership of Dr. M.S. Swaminathan and willing farmers. India has now embarked on Second Green Revolution which will enable increase in productivity and diversification of the

agricultural sector. The second green revolution will have the farmers in focus, farming technology as the friend, food processing and marketing as partners and the consumers as the angels to be satisfied. From now on to 2020, India will gradually increase the production to around 400 million tonnes of grains. The increase in the production will have to be done under the reduced availability of land from 170 million hectares to 100 million hectares with reduced water availability. We should also learn to diversify to meet specific consumer preferences, export markets and also in the interest of ecological balance. This is to be achieved through information access to all stakeholders and not with central controls or restriction of movements of agro products.

The challenges for the scientists and technologists would be in the areas of development of seeds that would ensure good yield even under constraints of water and land with ecologically balanced farming. The challenges for the scientist is indeed a knowledge graduation from characterization of soil to the matching of the seed with the composition of the fertilizer, water management and evolving new pre-harvesting techniques for such conditions. The domain of farming would enlarge from grain production to food processing and marketing. I visualize the state-of-the-art food processing industries for enabling the farmers and village enterprises to learn and produce products which are competitive in both national and international markets. Newer forms of co-operative entities are required to be established for ensuring maximum benefit to the farmers. E-marketing concepts may also be put into practice to provide farmers choices in selling. Some of the areas which need focus are: soil upgradation, dry land agriculture, temperature and salinity resistant seeds and minimum water cultivation. There have been successful experiments carried out by TIFAC team in Bihar, where per hectare output of wheat has been tripled by farmers in collaboration with agricultural scientists through scientific methods. As a result, the earnings of the participating farmers have remarkably improved. Such experiments can be replicated in many parts of our country, carefully tailored to local conditions. This is a crucial socio-economic need.

ICT is a potent tool in various sectors of activities in public domain, and agriculture is no exception. Demand and supply monitoring of

inputs, dissemination of technologies relevant to farming community through various organizations including universities, making available marketing information at grass root level are some of the usages of ICT in agriculture. Covering each and every farm family through village Panchayat knowledge centres, internet and community radio should be the aim for greater usage of ICT. Successful models of effective communication to the farm community through the use of ICT accomplished in different states can be presented in the exhibition for emulation by farmers of different states.

To achieve the vision of developed India, we have to simultaneously progress in five areas where India has core competence for integrated action: (1) Agriculture and food processing, (2) Education and health care, (3) Information and communication technology, (4) Infrastructure including electric power, networking of rivers, Providing Urban amenities in Rural Areas (PURA), and (5) Self reliance in identified critical technologies. These five areas are closely inter-related and if progressed in a mission mode will lead to food security, economic prosperity, social welfare and national security.

The number of PURA units for the whole country is estimated to be 7000. This envisages integrated connectivities to bring prosperity to rural India. These are - physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through internet kiosks; and knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes. These three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing of the products. Each PURA cluster will connect about 20-30 villages depending upon the region and population and will cost about Rs.100 crores. This is a viable and sustainable business proposition. After initial short-term employment during construction etc., we have to plan for initiating actions for providing regular employment and self-employment opportunities in nationally competitive small enterprises in agro processing, manufacturing and services sectors for about 3,000 people. If the industrial/business parks are marketed well, they can

generate employment opportunities in support and services sector for about 10,000 people. This will provide sustainable economy for the rural sector. In this national mission, bankers can promote entrepreneurship in the rural areas. This will lead to the removal of urban-rural divide.

A large number of banks have entrepreneurial development programmes. Banks have also been funding Small Scale Industries of different types in various regions. The small scale industrialist is a promising candidate for becoming the chief executive for managing the PURA complexes in an integrated way. PURA enterprises can also undertake management of schools, health care units, vocational training centres, chilling plants, silos and building a market, banking system and the regional business or industrial units. A new mission mode management style has to emerge for PURA enterprises. It should not be looking for protective legislations to support them. Rather they should be efficient to compete with others. This new PURA enterprise needs partnership from the bank, from the Government and also from the private entrepreneurs. Banks can train the entrepreneur for managing the PURA in their training centres and also provide them loans for creating and running PURAs as a business proposition.

Recently, we made some study at various parts of the country how the PURA model or its components are in position. I would like to discuss some of the examples.

Recently I had visited Periyar Maniammai college of technology for women and inaugurated a PURA Complex. I thought of sharing with you the developmental concept of a cluster of over 60 villages near Vallam, Thanjavur district of Tamil Nadu which involves a population of 3 lakhs. This PURA complex has all the three connectivities - physical, electronic and knowledge - leading to economic connectivity. The centre of activity emanates from the women engineering college that provides the electronic and knowledge connectivity. Periyar PURA has health care centres, primary to post-graduate level education and vocational training centres. This has resulted in large scale employment generation and creation of a number of entrepreneurs with the active support of 850 self-help groups. Two

hundred acres of waste land has been developed into a cultivable land with innovative water management schemes such as contour ponds and water sheds for storing and irrigating the fields. All the villagers are busy in either cultivation, planting *Jatropha*, herbal and medicinal plants, power generation using bio-mass, food processing and above all running marketing centres. This model has emanated independent of any government initiative. The committed leadership has been provided by the Engineering institution. This gives me the confidence that PURA is a realizable proposition and this movement can be multiplied by thousands of entrepreneurs, educational administrators and philanthropic institutions with the support of the government agencies.

Similarly, I have visited other tribal villages in south Gujarat and there another model of PURA has succeeded through the BAIF and Gujarat Government combination.

Food security and self-employment with good income is crucial in tribal and semi-arid regions. I would like to share with you an integrated village cluster development model. In these regions every summer the tribal people migrate to nearby towns. BAIF - (Bharatiya Agro Industries Foundation) has introduced a model in two villages with peoples' co-operation and the participation of state authorities. Firstly water harvesting was undertaken to get water for every individual. Every home was provided with livestock and also a market for milk. Simultaneously, fruit orchards were established with various fruit crops such as cashew and mangoes, which are tolerant to drought. When I visited these villages, there was a connecting road and water ponds. The tribal population, with radiant smiles on their faces, was harvesting crops, packaging and carrying milk to different supply points. I happened to see the economic growth and prosperity of the tribal people, which has been facilitated by BAIF with people's participation. I understand that this model Vadi (orchard) has now been replicated in many places by the state governments in the Deccan and desert regions. If such actions are multiplied in a reasonably synchronized manner, then locally generated wealth will increase and create new economic opportunities, thus creating greater income and prosperity levels.

Let me also highlight some independent initiatives that will become important components of PURA.

- (a) *Dry Land Farming*: ICRISAT with its international experience of working in arid regions is located in Hyderabad. They have developed short duration, disease and drought resistant varieties of important crops of this region beneficial to our farmers. They have introduced various tillage practices and nutrition management techniques to boost crop yields even under drought stress. We have to create mechanisms for enabling our farmers to interact closely with the ICRISAT and other research institutions to absorb and adopt these technologies for improving their income. It is essential for all organizations to spread this message to the farming community, particularly in dry land region.
- (b) *Waste Land Development*: With our increasing population the per capita land holding has been reduced. Still, over 30-40% of the land is underutilized or remains idle. Therefore, serious efforts should be made to plan the land use based on productivity. If the land is not good for intensive crop production the same can be used for establishing fruit orchards or tree plantations of economic importance. Further, degraded land can be redeveloped with biomass plantation which can help in promoting soil and water conservation, improve the eco system while providing fuel and fodder for our villagers.
- (c) *Project Siruthuli*: This is an initiative started by Coimbatoreans for Coimbatoreans. This ecological project aims to bring back the glory of Coimbatore and its rich heritage. The project is represented by people from all walks of life and professionally organized. The primary focus is on large scale rain water harvesting, afforestation, sewage / waste water treatment and solid waste management. They have already standardized five of the nine primary tanks in Coimbatore for large scale rainwater harvesting. Over 600 saplings have been planted on the bunds of the desilted tanks and are being maintained. They are moving towards a target of planting 15 lakh trees by the end of 2005. The

comprehensive study has indicated outlet of the city sewage as 10 million litres per day. A pilot plant is being taken up for sewage treatment to treat one million litres per day. The treated water will be sold to the agriculturists and industrialists as a revenue earning measure. The garbage and debris to the extent of over 26,000 cubic metres in one of the city's largest tanks have been removed. These are the major achievements for developing a growing city.

India has 700 million people living in 6,00,000 villages. Therefore rural sector is a big market. We need enterprises to service this need and generate large-scale employment. Entrepreneurs and captains of industries assembled here have a great business opportunity. Total eligible aspiring youth at any time in the country are 400 million. Estimated unemployment reported in the year 2004 is about 36 million, which is 9% of eligible employable population. Some of the important areas of employment are in the *Jatropha* plantation, extraction and processing (around 12 million); dryland farming, herbal cultivation and social forestry (around 20 million); lighting through non conventional energy, tourism and water missions (around 4 million).

I would like to discuss in detail some of the large-scale employment and wealth generating avenues in the rural sector.

- (a) *Jatropha – Biofuel*: Government has decided to permit mixing of 10% bio-fuel with diesel. This has opened up new opportunities for employment and wealth generation. We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland have been allotted for tree plantation. Certain multi-purpose trees such as *Jatropha* can grow well in wasteland with very little input. Once grown the crop has fifty years of life. Fruiting can take place in this plant in less than two years. It yields oilseeds up to five tonnes per hectare per year and produces two tonnes of bio-diesel. Presently, the cost of bio-diesel through the plant is approximately Rs. 17 to Rs. 19 per litre which can be substantially reduced through choice of right size of the plant and using high yield variety plantation.

Bio-diesel plants grown in 11 million hectares of land can yield a revenue of approximately Rs.20,000 crore a year and provide employment to over 12 million people both for plantation and running of the extraction plants. This is a sustainable development process leading to large scale employment of rural manpower. Also, it will reduce the foreign exchange outflow paid for importing crude oil, the cost of which is continuously rising in the international market. Moreover, use of bio-diesel is carbon monoxide emission free. This oil can also be used for soap and candle industries. De-oiled cake is a raw material for composting. Also Jatropha plantation provides a good environment for honey production. We should absorb the best of technologies available worldwide and start commercial operation soon, instead of staying at pilot plant levels. I would request the industrial community assembled here to take the initiative, generate detailed project report in collaboration with technical agencies such as The Energy and Research Institute (TERI) on this project and promote entrepreneurs with financial support from the banks in rural areas who can undertake the plantation and commissioning of extraction plants leading to production of cost-effective bio-fuel. Can there be a better project than this for coherent development of our rural sector and sustainable business proposition for industry?

- (b) *Rural Lighting*: Recently, I received an e-mail from Chintapalli Gramam, Nalgonda District of Andhra Pradesh about the implementation of LED lighting through solar power in a remote village inhabited by Lambada tribes. The village has a population 142 people residing in thirty houses. The one time cost of providing LED lighting for all the houses including wiring and solar charging system for the battery is around Rs. 65,000. On an average, the cost of providing electricity per house works out to Rs. 2200. This is definitely much cheaper than the cost of providing electricity to the village through a power line running into a number of kilometres costing many lakhs of rupees. Particularly in

remote areas and hilly regions electricity could not be reached due to high initial cost of installation. Presently I am told electric lines have not reached over one lakh villages in our country. LED power system is a self-contained system in which the energy cost is virtually free since solar energy is used to charge the batteries. I would recommend the industrial community to study this project for converting it as a business proposition, which can be taken by rural enterprises for implementation in different sectors. Once successful this technology can find utility in many parts of the world where similar situation exists. This has tremendous business potential.

- (c) *Electricity Generation through Municipal Waste:* Increased urbanization has led to a serious problem of accumulation of municipal solid waste. Efficient and environmentally clean disposal of garbage has always been a major technological challenge. While being a threat to the environment, mounting garbage is also a rich source of energy. The potential for converting this waste into useable energy, which will eliminate a major source of urban pollution, was realized by one of our innovative organizations — Technology Information Forecasting and Assessment Council of DST which helped in developing a completely indigenous solution for the processing of waste into a source of fuel. This fuel could, in turn, be used for generation of electricity through mini plants. Two entrepreneurs in Andhra Pradesh adopted the technology with refinement and established two independent plants in Hyderabad and Vijayawada generating over 12 megawatts of electricity which is being supplied to the State Grid. India needs thousands of mini power plants using municipal waste. Industrial sector can provide the thrust for promoting creation of such power plants in major municipalities as first step in collaboration with banks and non-governmental organizations.

These are some of the examples of rural development projects which can be promoted by the industry with the active participation

of banks for upliftment of the 700 million people living in our villages. There are similar possibilities in water, habitat, infrastructure, ICT, agriculture and many more. Once the industries get committed in all these sectors in a proactive manner, I am sure the path to development will be much smoother and our realization of development will be much faster. So far we have discussed about the profile of Developed India leading to economic growth. Our nation, compared to other developed parts of the world, is endowed with certain civilizational heritage. For a prosperous, happy and safe India and peaceful planet we have to integrate the economic prosperity with civilizational heritage through the evolution of enlightened citizens. India can definitely provide the leadership in building enlightened global citizens.

There are many challenges in our planet Earth of six billion people. India alone houses one sixth of global population. Reforms are needed in the United Nations to reduce the tensions and tensions transforming into war between nations. Many nations are experiencing the problems of injected terrorism. The young people of the planet are dreaming to live in the land of opportunities and happiness. We have also seen that the economic prosperity of a few nations alone has not brought lasting peace to the world. In such a situation, it is essential to evolve the principle of enlightened citizenship based on oriental ethos. The enlightened citizenship has three components: education with value system, religion transforming into spiritual force and bringing economic prosperity through development. This mission can be put into action in the global scenario bringing together all the nations of the world, economically and spiritually. How can it be done? All the children in the age group of 5-17 years will be learning in the schools and at home, the education with value system, with the teacher in the centre stage. Every religion has got two components: religious dogmas and spiritual preachings. The spiritual focus influenced by compassion and love must be nurtured as an integrated mission. In many nations, in spite of their core competence, material wealth, biodiversity and human resource, still certain percentage of people are below poverty line. By using the core competence, with competitiveness as a base and the mission of transforming the developing nation into a developed country, I am sure all the nations in the globe can benefit from the

Indian experiment which I have explained to you in the earlier portion of my talk.

I have the following suggestions for consideration of this forum of experts:

- (1) Collating the best models of development across the world, which can be shared by member countries with appropriate modifications suiting local needs. For example, the Indian concept of PURA model.
- (2) Promoting an education system with values and endeavour to make it available for all sections of the society.
- (3) Knowledge society is built on innovation which will enhance the quality and quantity of output from the information, manufacturing and agriculture societies. Evolving methods by which nations can graduate towards knowledge society is a vital requirement.
- (4) Change in thinking and strategies are essential for all the sectors of economy. In this respect I would like to quote the management expert C.K. Prahalad who says, “The real source of market promise is not the wealthy few in the developing world, or even the emerging middle-income consumers. It is the billions of aspiring poor who are joining the market economy for the first time”.
- (5) A world organization is essential to promote in an integrated way among all countries, education with value system, transforming religions into spiritual force and leading the nations to achieve economic prosperity.

Righteousness of the heart of the human being leads to a perfect life of an enlightened citizen. This is beautifully explained in ascent and descent phase of human life by Confucius. He states that “People who desired to have a clear moral harmony in the world, would first order their national life; those who desire to order their national life would first regulate their home life; those who desire to regulate their home life would first cultivate their personal lives; those who desired to cultivate their personal lives set their heart to righteousness, would

first make their wills sincere; those who desire to make their wills sincere would first arrive at understanding; understanding comes from the exploration of knowledge of things. When the knowledge of things is gained, then understanding is reached; when understanding is reached, then the will is sincere; when the will is sincere then the heart is righteous; when the heart is righteous then the personal life is cultivated; when the personal life is cultivated, then the home life is regulated; when the home life is regulated, then the national life is orderly; when the national life is orderly then the world is at peace. From the Emperor down to the common man, the cultivation of the righteous life is the foundation for all.”

I wish this symposium on Uncommon Opportunities: A Roadmap for Employment, Food & Global Security, every success in the dynamic and challenging global environment.

Keys to Gain a Competitive Edge

I AM DELIGHTED to participate in the 25th Convocation of the National Institute of Design, Ahmedabad which is a multi-disciplinary institution in the field of design education, applied research, training, design consultancy services and out-reach programmes. My greetings to the Chairman and members of the NID Governing Council, Executive Director, Faculty Members, researchers, students and distinguished guests. My congratulations to the Graduates and Post Graduates for their excellent academic performance.

Design interprets culture. Culture creates values and values shape the future with competitive marketing. The Faculty Members of this institute have been propagating this phenomenon of design among the students and preparing their minds for creating a good future for themselves and the industry of which they become a part. This I would consider a significant human resource development providing value addition to our native products and they deserve recognition and commendation. Competitiveness is the key for transforming India into a developed nation. Now I would like to discuss the Law of Development and competitiveness.

I was studying the development patterns and the dynamics of connectivity between nations, especially in trade and business. As you all know the world has few developed countries and many developing countries. What is the dynamics between them and what connects them? Developed country has to market its products in a competitive way to different countries to remain as developed country. The developing country to get transformed into a developed country, it too has to market its products to other countries in a competitive way. Competitiveness has three dimensions: quality of the product,

cost effectiveness and supply on time. Indeed this dynamics of competitiveness in marketing of products by developing and developed countries is called the law of development. The students of the National Institute of Design have a very important role to play in improving the quality of the product by injecting aesthetics, user friendliness, promoting cost reduction techniques through the use of locally available raw material and creating designs using existing processes.

Technology is a non-linear tool that can effect the most fundamental change in the ground rules of economic competitiveness.

Technology consists of stages like research and development, technology transfer, technology absorption, and production of products or systems with the desired performance, quality, and cost-effectiveness. Technology development can be achieved through two routes — Route A and Route B. Route A (know-how) involves obtaining licensed technology or techniques including manufacturing, design drawings, and production processes from an established manufacturer from abroad.

Route B (know-why) begins with designing and developing indigenous technology. In the case of India, progress in technology, particularly indigenous design, is the thrust area to enable India to become competitive with other countries. To be competitive within India and in the global market, it is essential to evolve a value-chain in a product life cycle. Value-chain is provided for the wealth generation and quality improvement in percentages. In any product among specifications/requirement, design, process, manufacturing, services, and product improvement, wealth generation depends largely on the design strength, which is 60% of the product life cycle effort. It is also evident that the quality has to be built in at an optimal level during the design phase itself (quantitatively about 40%). For a product value-chain, largely design effort with built-in quality influences the competitiveness of the product.

Based on the experiences gained in launch vehicles and guided missiles, India has the competitive edge to design and develop any type of launch vehicle, missile, military aircraft and reusable systems. With the partnership of Indian academic institutions, industry and

different R&D departments, we can definitely see the tremendous strength India has in critical sectors. The younger generation must understand India's capability to carry out complex aerospace designs with an integrated approach. This also establishes that India has the capability for systems design, systems engineering and systems integration of rockets, missiles and launch vehicles. This capability has provided the necessary impetus for the production and marketing of aerospace systems to the customer's delight.

Indigenous design and development capabilities are the keys to gain a competitive edge. The competitive edge is governed by low cost, high quality and superior performance, and timeliness that will bring customers delight which is a function of design and development, manufacturing and service.

The nation's strength in the design and development of high technology products and product engineering will also increase exports. It is therefore important that the Indian R&D sector, design centres, and industries recognise this dimension of technology.

We have made the leap from CAM to design-integrated manufacturing for aerospace systems and automobiles. Virtual Reality (VR) simulations have also evolved. The additional feature now is a new software that provides immersive visualisation of a 3-D environment. This technology has been used for walk-throughs in LCA prototypes which is saving 40% of the design time in the LCA undercarriage assembly and environmental control system bay. Similar VR models have been used in designing the Indica car of Tata Engineering. Rapid prototyping technologies (or free form fabrication) can build up complex 3-D parts direct from CAD input without any other machinery.

CIM is the automated version of the manufacturing process where the three major manufacturing functions — product and process design, planning and control, and the manufacturing process itself — are integrated by the automated technologies described above. Further, the traditional integration mechanism of oral and written communication is replaced by computer technology. Such highly automated and

integrated manufacturing is also called the “Factory of the Future”. The Heavy Alloy Penetration Plant (HAPP) in Tiruchirapalli established by DRDO for Ordnance Factory is an example where this concept has been applied for manufacture of FSAPDS (Fin Stabilised Armour Piercing Discarding Sabot). Established in 1988, this factory has led to tight tolerances consistency and repeatability in production, lower rejection rates, and large production volumes. What would have normally required 600 workers is being carried out faster and to the required quality with an 80 member team.

India has to work hard in value addition techniques in its manufacturing industries, in honing the core competency of skilled manpower, in procuring raw materials, and in upgrading capital equipment.

We must create a sound environment to help the manufacturing sector cope with the emerging challenges of globalisation. This could include the following measures:

- Special thrust on modernisation and technology upgradation of existing units,
- Special package for promotion and development of small and village enterprises,
- Consortium of Indian R&D laboratories and industries to gain design development that will enhance competitiveness,
- Technology support,
- Marketing support,
- Credit support,
- Entrepreneurship development,
- Promotion of self-employment,
- Infrastructure, and
- Facilitation.

NID is an important institution which has already interacted with multiple R&D organizations such as DRDO, ISRO, ADA and industries

to enable product engineering of the prototypes. This contribution has enhanced the value of the product and increased the competitiveness. With this background, I would like to discuss one example of my experience with NID.

Aeronautical Development Agency (ADA) a DRDO establishment has developed a technology for Maintenance Training Simulator (MTS) for improving the quality of maintenance of Air Force equipment which has been granted a product patent. When the first aircraft system maintenance simulator was built for MIG 29 aircraft by ADA and evaluated by the Air Force they gave the following comments:

- (a) They related it to a personal computer instead of high tech simulator due to the product look.
- (b) Visual displays required improvement for better cognition.
- (c) Equipment needed better user friendliness.
- (d) Facility required for importing visuals developed using imported software packages.

To meet the requirements of the Air Force, ADA approached National Institute of Design (NID) for getting design support in view of their excellence in industrial and communication design. NID team headed by Dr. S. Ghoshal, Centre Head, NID Bangalore Centre supported by diploma students redesigned the simulator utility panel to repack the equipments of Aircraft System Maintenance Simulator (ASMS). ADA and NID team also gave ergonomic improvement to visual representation. I understand that the designers of NID followed design intervention techniques which involved:

- * Assimilation of task brief and research,
- * User studies and requirement analysis,
- * Planning and ideation of design concepts,
- * Product visualization and design concept development,
- * Value engineering and design freeze,
- * Material analysis and selection,

- * Design validation through prototyping,
- * Manufacturing drawing release and prototype fabrication, and
- * Production drawing freeze.

With this approach ADA was able to deliver a domain free ASMS to Air Force Technical College, which is now being extensively used and has been found to meet all the requirements of ab-initio training of aeronautical engineers on combat aircraft system. With this background the Air Force asked ADA to develop multiple types of training systems and maintenance simulator for MIG 21 BIS upgrade aircraft requirements. The intervention of NID has resulted in producing simulators which has a high level of acceptability by the user. Looking at the professionalism of product, potential users are asking ADA to develop and deliver multiple products to meet their training requirements.

As you are aware the rural development programme of our country is implemented through the creation of PURA (Providing Urban Amenities in Rural Areas) in our village clusters. This area is a fertile ground for creating small scale, cottage and artisan based industries based on our native knowledge. The designers of National Institute of Design can make an important contribution in developing products for enterprises based on traditional knowledge. Hence I would like to discuss the concept of PURA.

Nearly 700 million people of India live in the rural areas in 600,000 villages. Connectivity of village complexes providing economic opportunities to all segments of people is an urgent need to bridge the rural-urban divide, generate employment and enhance rural prosperity. The essential needs of the villages today are water, power, road, sanitation, and health care, education and employment generation.

Essential Connectivities through PURA: The integrated methods, which will bring prosperity to rural India are: the physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre

optic cables reaching the rural areas from urban cities and through internet kiosks; and knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes — these three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing the products.

When the PURA enterprises emerge one of the very important requirements is employment generation. In a cluster of villages there may be many types of competencies like artistic work, cottage products and small scale industrial products. Most of the time our products may not be competitive in the international market. Therefore, it is essential that our products should have a new look and production capability in large numbers with technology addition through the design intervention of NID designers.

Now I would like to discuss some of the products where design and computer aided design intervention has provided a new thrust to some of our rural products.

The silk industry in Kancheepuram is one of the fastest growing industries in India. The industry currently employs more than 30,000 weavers in the art of saree making. The industry had to compete with the synthetic fibre industry in many aspects. The industry was on the brink of extinction due to the obsolescence of the designs and design making procedures. This is because, design adds splendour to a saree and forms an integral part of its exquisiteness. This may be true with many handloom saree producers in different parts of the country. Introduction of computerized Jacquard border design in Kancheepuram silk saree has helped in the revival of the industry. The use of Computer Aided Design has not only helped in creating new and complex designs but also reduced the time involved in the design. There has been an increase in the exports. The acceptance of these silk sarees by the consumers has also increased with the automation of designing process. Visualization of saree designs ahead of its production and the ability to create new colour combination at the click of a mouse has increased the flexibility and reduced the time for realizing new designs. Though

the materials and the techniques are changing with the market demand, the motifs are still conventional to hold the custom and tradition of the Kancheepuram saree. The silk industry in Kancheepuram has transformed into a high growth industry by opening up new avenues for the traditional weavers. The example illustrates that computer aided design can help renewal of a traditional industry provided the new technology is simple to use and users are trained properly which is compatible with the traditional manufacturing process.

Leather industry is a traditional industry. Kolhapuri is a traditional chappal manufactured through a manual process. This is a case study of the manner in which the design process, manufacturing process and marketing was re-engineered using CAD interventions. Use of Computer Aided Design helped this industry to reposition itself. The main reason for the early adoption and rapid diffusion of the new technology has been the systematic training carried out by Central Leather Research Institute (CLRI) for imparting skills to the local craftsman using two people from the same trade. The income of craftsmen increased considerably after the adoption of CAD for designing and market access. The production increased from about 20 pairs per week to almost 200 pairs per week. CLRI also helped in changing the manufacturing process such that the productivity has gone up apart from the use of computer aided design. The designs have shown a quantum jump both in terms of quality and variety. The whole project was implemented under the National Leather Technology Mission. An NGO from Bangalore helped in selling the chappals on line thereby enhancing the price realization. The exports have shown an increase. On the whole this is an exciting experience of using new technology to re-engineer and renew a traditional industry. The main reason for the success has been the training of the local craftsman by CLRI.

These two experiences clearly indicate the success components of such missions. They are application of Computer Aided Design, partnership with the R&D and entrepreneurs, value added training to the craftsmen, and marketing support. Graduates and Post-graduates

of National Institute of Design should work towards replicating this model in different parts of the country. State and Central Government should proactively facilitate nurturing of the industry.

India has various forms of disasters — landslide, earthquake, floods, cyclone and tsunami. Why not generate designs of locations specific options of habitats of various types and sections of people so that loss of lives is reduced? Also of options of designs for structures in sea coast which can minimize deaths and property loss?

There are yet unconfirmed reports that the tribal population and animals including cattle were not affected by the Tsunami as much as the other population.

We must work towards learning the right lessons even from this disaster so that our future can be safe. The fishermen of late seem to have been pushed to live more close to the sea shore than ever before due to the demands placed by tourism and urban development. I strongly feel that this trend should be reversed and the law that human habitats should be atleast 500 metres away from the sea should be strictly enforced.

In spite of various precautions disasters and accidents happen. Often we do not handle crises systematically. For example there are high rise shelters in areas often prone to floods or cyclonic rise for people to stay for a few days till floods recede. Even fast evacuation system can have designs without stampede which cause death. World over designers apply their mind to these practical issues.

During my visit to the North Eastern States particularly to Arunachal Pradesh and Nagaland, I found in every village even every house has a unique pattern of life. They hand weave their dresses and dye them themselves with beautiful colours. They make their own headgears. A design organisation like yours can visit and study this traditional craftsmanship capability and hand weaving capability for further augmentation through technology and design, so that we can enrich the people of Arunachal Pradesh and Nagaland.

There are 540 million youth below 25 years in the population of a billion people. The nation needs young leaders who can command

the change for transformation of India into a developed nation embedded with knowledge society. The leaders are the creators of new organizations of excellence. Quality leaders are like magnets that will attract the best of persons to build the team for the organization and give inspiring leadership even during failures of missions as they are not afraid of risks. I have seen and worked with creators of vision and missions.

One of the very important ingredients for success of the vision of transforming India into a developed nation by 2020 is the evolution of creative leaders. I am giving a connectivity between developed India, economic prosperity, technology, production, productivity, employee role and management quality, all of which linked to the creative leader. Who is that creative leader? What are the qualities of a creative leader? The creative leadership is exercising the task to change the traditional role from commander to coach, manager to mentor, from director to delegator and from one who demands respect to one who facilitates self-respect. The higher the proportion of creative leaders in a nation, the higher the potential of success of visions like “developed India”.

Mission of National Institute of Design is the creation of creative leaders who will be participating in the transformation of India into a prosperous, happy and strong nation. I wish all the graduates and post-graduates a very bright future and I am sure you will make India’s second vision a reality through your creative skills.

Critical Features of Project Management

I AM DELIGHTED to participate in the inauguration of Gyan Lahari - Asia Pacific 2005, Project Management Conference. I am happy to deliver the inaugural address. I extend my greetings to the organizers, project management experts, students of project management programmes, other delegates and distinguished invitees. While executing various national programmes, my team and myself have gone through certain experiences in project management. Based on this, I would like to discuss the topic “Some experiences in Project Management”.

SLV-3, IGMDP and the LCA programmes have taught me certain critical features of programme management which, I would like to discuss. They are:

- (a) Igniting the minds for a programme thrust,
- (b) Evolution of management system,
- (c) Choice of programme and project directors,
- (d) Organizational dynamics,
- (e) Review mechanisms for robust management of the programme,
- (f) Importance of recognizing the contribution made by the team members,
- (g) Technology denial management,
- (h) Failure management,
- (i) Ingredients of successful project management, and
- (j) Creative leadership.

All programmes based on national priority must have a clear vision. On 10 February 2005, three Light Combat Aircraft - Tejas designed, developed and produced by Aeronautic Development Agency, Bangalore in partnership with Hindustan Aeronautics Limited, flew as a part of air show demonstration of Aero India 2005, after logging 187 flight hours. This incident made me recall the experience and thoughts I had while witnessing the Paris Air show along with Dr. V.S. Arunachalam, the then scientific advisor to Raksha Manthri, and Dr. Kota Harinarayana, the then Programme Director, ADA and Dr. K. G. Narayanan, Director ADE in the year 1990. It was a beautiful morning, when we were seeing many of the European, American and Russian fighters crossing the sonic barrier and entering supersonic flight speed.

That time, I wrote a verse

*“Let us build our fighter aircraft,
A unique aircraft in its performance,
Which should fly with Indian Flag,
In the Paris Air show”.*

At that time the Indian Light Combat Aircraft programme was in the drawing board and in the computer aided design stage with many technological options and managerial conflicts. On 9th February 2005, part of the vision has been realized by flying the three LCAs in the Indian Air Show. We have still to work towards flying our aircraft along with the European, American and Russian fighters in the Paris and other air shows being conducted in different parts of the world. I am sure it will definitely take place. We are very close to such an event. The most important thing is LCA should be inducted into the service and a number of squadrons should become operational with LCA.

Whenever a project is undertaken by any team it becomes responsible for executing the task to the stated specifications, within the prescribed time and within the prescribed cost. This is true of all projects. To fulfil the responsibility the project has to be provided with adequate resource and the authority to use the resource for meeting the end goals of the Projects. Preferably the project report with time

required and cost of the project should come from the people who are responsible to execute the project. Thus, while the missile programme was proposed for around Rs.400 crore in 1983 along with the programme, a three tier management structure was sought with delegated financial, administrative and technical powers for each tier of management. In addition the additional manpower needed by various work centres numbering 1,200 including campus recruitment methodology was sought. The programme was approved with budget, PERT, additional manpower and management structure after lot of discussion at various levels. Simultaneously, a total management plan was worked out by an internal DRDL team so that a well structured management philosophy and procedure is available for meeting all the eventualities envisaged during the different phases of the programme. This management plan was evolved based on the experience of the management plan derived for SLV-3 and approved by Dr. Brahm Prakash. Sanction of the programme with the funds, the management structure, special delegation of powers and special recruitment process was the unique feature of the missile programme.

I am discussing now this successful management structure so that it can be used for other projects in the country and elsewhere. The management structure of the missile programme consisted of Guided missile board, Programme management board and the Project management board.

- (a) The Guided Missile Board laid the policy direction for the total programme, facilitated the provision of support from all external agencies, resolved inter-programme conflicts and provided a long and medium term vision to the project executives. It had the financial power of Rs.9 crore per item. This board was chaired by the SA to RM with Defence Secretary, Secretary (DP & S), Secretary (Expenditure), the vice chiefs of the three services, FA (DS), CMD (BDL), DGOF and renowned scientists from National Laboratories were members. Programme Director (IGMDP) was the Member Secretary. Periodicity of meeting was twice in a year. It can be seen that the board consisted of highest authorities from the government, multiple production

agencies, all the three users from Armed forces and the development agency.

- (b) The Programme Management Board was responsible for executing the programme and lead the missile systems into production. It resolved inter-projects conflicts, provided inter/intra project co-ordination and created the infrastructure, facilities and the technologies needed for the programme well ahead of time. This Board had the financial power of Rs.2 crore per item. This Board was chaired by the Programme Director (IGMDP) who also happened to be Director (DRDL) and Directors of all the participating laboratories, Additional Financial Advisor, key representatives of users, executives of production agency and all the project directors were members. Director (Planning and Resource Management, DRDL) was the Member Secretary. The periodicity of the meeting was three times in a year.
- (c) The Project Management Board was responsible for executing the project by developing the individual missile system and leading to production. It had the responsibility for developing the technology specially needed by the individual projects. This board had the financial power of Rs.25 lakh per item. Project Director was the chairman, Project Managers from all participating work centres, user representatives, Deputy financial Advisor (missiles), general managers from missile production agency were members. Member Secretary was nominated by the Project Director. The periodicity of meeting was once in two months.

An important tool of project programme management was the dynamic PERT chart and not the Bar chart. At every project or programme management board meeting, we insisted on the presentation of the latest PERT, based on the present state of progress and asked for the critical path. It should be noted that the critical path becomes different during different phases of the project and also different based on the level at which project is reviewed whether it is Project Management Board, Programme Management Board or the Guided Missile Board.

In June 1983 the Integrated Guided Missile Development Programme was about to be sanctioned. That was the time we had to select the Project Directors for Prithvi, Agni, Akash, Trishul and Nag. In DRDL, at that time many experienced Scientists in Development were competing candidates for this task. Many of them were over fifty. To enable the selection of the most suitable candidate for heading these projects we followed a novel procedure. I called for the meeting of the Management Council of DRDL and the agenda for the meeting was to finalise the criteria required for the selection of the Project Directors. I asked each member of the Management Council to write one characteristic which he considered essential for the selected Project Director. The characteristics mentioned by the members for an effective Project Director were as follows:

- (a) should be a post-graduate or a doctorate in rocket technology or system engineering,
- (b) should have achieved excellence in any one of the technology in missile area or in management,
- (c) should preferably be a good missile system designer,
- (d) should be a team person,
- (e) should be a good leader,
- (f) should be able to get along well with the team, and other agencies contributing to the programme,
- (g) should have minimum ten years of service left so that the Project Director can see that the missiles are developed and successfully led to production, and
- (h) should be a person of unimpeachable integrity.

When we discussed all the characteristics together, there was convergence among members that the following are the most essential characteristics of the Project Directors: credibility of the person in achieving excellence in one of the technologies or management is the first essential quality. Secondly, Project Director should be young enough to design and develop the missile and lead it to production. Thirdly, the selected candidate should be a person of unimpeachable integrity. With these criteria Scientists of the age group below 40

became the obvious choice for becoming the Project Directors of the Programme. Simultaneously, I nominated the other experienced Senior Scientists as Technology Directors with the responsibility of developing the technologies required by the projects. This created a technological link between the Project and Technology Directors. Project Directors had the sanctioning power which created a healthy relationship between the Project Directors and the Technology Directors.

As an anecdote to this, I would like to mention how we decided on the name of the projects. In a special meeting we invited all the Project Directors and Technology Directors to decide on the names. We put the criteria that the name should be indicative of the performance of the missile systems; it should be simple, there should be an Indian-ness about the name and should be familiar to every one. On this basis the names Agni, Prithvi, Trishul, Akash and Nag were chosen and today these names have become household names in many places. People at large, common man and even high school students are aware of these names and know what type of missiles these names indicate.

The unique feature of the Integrated Guided Missile Development Programme was that it included the funds required for limited series production of the missile systems. The programme, thus, had four different phases, viz. the design phase, development of sub-system and systems, trial and evaluation including flight trials and production of the systems. The laboratories executing the programme had to be appropriately organized for managing the load of the different phases of the programme. Realizing this feature initially in 1983, DRDL was reorganized to undertake the complex Integrated Missile Development Programme and execute the first phase, viz. the design phase. The activity level was being continuously monitored to see the result of this reorganization. Initially, the activity index was around 40% which rose to nearly 60% during the period 1983-86. By this time, the laboratory has entered into the second phase, development of sub systems and systems and conduct of flight tests in some cases. Since the activity index showed saturation characteristics and started slightly drooping, we had to carry out the second reorganization in 1986 to improve the activity index for that period. With this reorganization the activity index rose to nearly 70% by the year 1998

when flight tests of Trishul, Prithvi and Agni were all carried out. Then there was again a tendency for the activity index curve to droop which led to the third reorganization in late 1989 while the programme entered the production phase and orders for two missile systems had been placed on the production agency and Nag and Akash system were ready for flight tests. The message which I would like to convey is that the projects, the programme managers and the work centres must be sensitive to the organizational dynamics and organizational output of the different phases of the programme and plan reorganization well in advance so that the organization maximizes its output.

With the sanction of the missile programme in 1983, we had created an institutional mechanism of robust review of all stages of the projects. These reviews included preliminary design review, critical design review, sub-system review, system review, static test readiness review, flight test readiness review and post-flight analysis. The important feature of the review mechanism was the review experts were drawn from different specialization working in different laboratories and universities spread in different parts of the country. Any expert available in the field was sought by the project as a review member which enabled them to get the collective wisdom of specialists on technical issues. Review recommendations were executed faithfully by the project team in a time bound manner. In addition to this, failure analysis board and waiver board were also created for undertaking the review and corrective action for certain classes of failure and authorizing waivers in marginal cases. The quality and reliability team was asked to work out a reliability model of the system under test and present it before flight test readiness review so that the flight test authorization board can take a considered view on the desirability of proceeding for the test in case the reliability margin is low. The reliability model was constantly updated based on the predicted reliability and the performance of the system during the flight test. I always found that the confidence of the scientists and the team became very high if the review was carried out objectively. Also hidden problems were invariably brought out during the review which became a valuable input to the programme.

I would like to recall an event which took place in 1995. We were having the LCA roll out in the HAL Bangalore campus. To my surprise I found that the most important person who was the lifeline of the programme was sitting in the first row. I did not know why he was sitting there. At that stage during my welcome address I started describing about Dr. Kota Harinarayana's contribution in the development of the LCA. I called him to the dais and gave my chair. Immediately they brought another chair for him for being seated on the dais. There was a big cheer from the crowd since all of them acknowledged the contribution of Dr. Kota Harinarayana for the programme.

At this stage I would like to describe my experience while working on the design project of the fourth stage Apogee motor. During Dr. Sarabhai's time, Dr. Muthunayagam was the Design Project Leader for the third stage. Dr. M.R. Kurup was the Design Project Leader for the second stage. Dr. Gawarikar was the Design Project Leader for the first stage. Dr. Gupta was the Design Project Leader for the guidance system. Prof U.R. Rao was the Design Project Leader for the Rohini satellite. I was the Design Project Leader for the fourth stage and the heat shield. The review was carried out by Dr. Vikram Sarabhai. He normally invites for such reviews experts from academic institutions. Since it was a design phase, for this review he had invited Prof I.G. Sharma, a well known Guidance and Control System and Simulation Expert, Prof Narasima, aerodynamic design and atmospheric sciences, Prof Mahapatra, radar system and Prof K.A.V. Pandalai, aerospace structure. Every project leader gave a presentation on the progress and problems relating to their task. Finally when my turn came, I gave a three minute presentation on the overall status of the project. Later, I asked Shri Sudhakar, System Designer, Shri Sathya, Composite Products Engineer, Shri Abdul Masjid, aerospace mechanism Engineer and Shri Namboodri, Rocket Motor Designer to give short presentation on the progress of sub-system design. When my team completed the presentation, discussion time came. Many technical and managerial questions were asked. I answered. At that stage there was a question from an experienced scientist. Mr. Kalam, I saw the presentation from your Team one after the other. What have

you done? How to answer this question? I was framing the answer. Dr. Vikram Sarabhai said, “Mr. so and so, what Kalam did is indeed project management. That is how I would like to hear from the people who have actually carried out the task. Project management demands that the project team must be able to get things done from different people and different institutions. People who contribute to the project should know that they are very important for the project, and they are remembered.”

In the year 1992, LCA team decided to go for Digital-Fly-by-Wire Control System (FCS) for the Combat Aircraft as it is an unstable aircraft. At that time, the country did not have the experience in developing FCS. The only two countries who had the experience were France and US. The French company (Dassault System) had expertise in Hybrid systems whereas our need was an all Digital-Fly-by-Wire. Hence, it was thought appropriate to have a US partner who has the capability in design, development and integration of FCS on fighter aircraft. There were three candidates, General Electric Control which later became LMCS (now called BAe systems), Lear Astronics and Bendix. Finally, we chose LMCS for the contract since they had the experience in designing FCS for F-16 Aircraft. Joint Team for design and development of the FCS was formed with ADE (DRDO Labs) and LMCS. The work share between Indian team and LMCS team was identified. Evolution of the SRS was the joint effort. The prototype flight control computer was to be done by ADE. Total system integration was the joint responsibility. Flight certification was to be provided by LMCS.

The contract progressed though a bit slowly between 1992-98. Then, as you all are aware, India carried out its nuclear test on 11th May 1998. As soon as this event occurred the American Government imposed technological sanction. Due to the sanction, LMCS broke the contract and retained all the Indian equipment, software and the technical information which were in their premises.

This was definitely a shock for the Indian team. Immediately, I called for a meeting of Directors of ADA, NAL, ADE, CAIR, HAL, National Flight Test Centre, Prof I.G. Sharma, a renowned control

system specialist, Prof Goshal, a noted digital control system expert and guidance and control specialists from DRDL and ISRO. The FCS team explained to these members the situation arising out of the unilateral termination of contract by LMCS. We had a full day discussion on the methodology which now need to be followed by which we can successfully complete the development of digital fly wire system and fly the LCA. The team after prolonged deliberations gave a structured method by which the development can be completed and the system can be certified for flight trials. They also mentioned that they will support the programme in whatever capacity they have to work with the ADE and ADA teams.

Based on the recommendations of the specialists we immediately strengthened the ADE software team with additional ten experienced software engineers from ADA. ADA was given the responsibility of verification and validation of software. Integrated flight control system review committee was constituted with Director (ADE) as Chairman and PGD (ADA) as Co-chair to support development and resolve all the conflicts arising between Control Law Team, Iron Bird, Software, Hardware and simulation. This team met once in a week and brought out all the issues arising in different work centres and solutions were found. In addition, an Iron Bird review team was formed with Project Director Flight Control System as Chairman with members from HAL, ADA, ADE, certification agency (CEMILAC) and Test Pilots from National Flight Test Centre as Members. This team also met every week and resolved all the problems arising in the development and Test on Iron Bird. We also introduced participation of certification agency (CEMILAC) and inspection agency (CRI) in all these reviews. The aim was to see that any problem in any system is brought into focus at the earliest so that the solution can be found. In addition, we made it a point to have a special agenda in the monthly technical committee meeting on the development of integrated flight control system wherein Director (ADE), Director (NAL), Director (National Flight Test Centre), General Manager (HAL) presented the progress and problems. The confidence building took place by intensifying the tests. For example informal Iron Bird test was carried out over thousand hours and the formal Iron Bird test was conducted over hundred

and fifty hours. Similarly, Pilot flew the simulator for more than two thousand hours. Thus, what we missed from the foreign partner, we compensated by enhancing the critical design review and increasing the test time to ensure safe man rated design of the integrated flight control system.

The entire team took the denial as a national challenge. They said if it is going to take three years we will do it in two years. If it is going to take twenty million dollars we will do it in ten million dollars. Our working hours were not eight hours. We will work twenty-four hours a day and complete the task. That is the time I realized the power of Indian Scientific Community, and the power of our country. I realized that no country can dominate us by imposing technological sanction or economic sanction. Power of scientific team will defeat the petty designs of any nation. Today I can proudly say that our scientists have designed, developed, tested, evaluated, and integrated the flight control system in the LCA which has logged more than 388 trouble free flight sorties in three different aircraft. The challenge of the development is that the aircraft of this class is being designed for the first time, and we introduced the state-of-the-art digital fly-by-wire technology in the very first prototype which is unstable. We on our own developed the final hardware and software required for testing and evaluation of the control system in the aircraft, after the foreign partner leaves the scene and our own certification team which had no experience in certifying fly-by-wire aircraft, gains confidence and certifies the aircraft as flight worthy. Above all, the pilots who have never flown a prototype which is unstable with a fly-by-wire system confidently flew the aircraft based on their flying experience in the simulator and the Iron Bird. Honest self assessment, identification of area of uncertainty and all out effort to solve the problem was an important aspect of this programme. Integrating strength of industry, R&D Labs, Academic and Air force helped to achieve, what was perceived to be an impossible task. This is a demonstration of the Indian will that 'we will win'.

Two and a half decades ago while I was working at ISRO, I had the best of education which won't come from any university. I will narrate that incident. I was given a task by Prof. Satish Dhawan the

then Chairman, ISRO to develop the first satellite launch vehicle SLV-3, to put ROHINI Satellite into orbit. This was one of the largest high technology space programmes undertaken in 1973. The whole space technology community, men and women, were geared up for this task. Thousands of scientists, engineers and technicians worked resulting in the realization of the first SLV-3 launch on 10th August 1979. SLV-3 took off in the early hours and the first stage worked beautifully. But the mission could not achieve its objectives, as the control system in 2nd stage malfunctioned. There was a press conference at Sriharikota, after the event. Prof. Dhawan took me to the press conference. And there he announced that he takes responsibility for not achieving the mission, even though I was the project director and the mission director. When we launched SLV-3 on 18th July 1980, successfully injecting the Rohini Satellite into the orbit, again there was a press conference and Prof. Dhawan put me in the front to share the success story with the press. What we learn from this event is that the leader gives the credit for success to those who worked for it, and leader absorbs and owns the responsibility for the failure. This is leadership. The scientific community in India has the fortune to work with such leaders, which resulted in many accomplishments. This success generated great happiness among all my team members. This is an important lesson for all project managers.

Since the audience may consist of members from the industry, corporate institutions and government establishments and students of project management, I would like to talk to you about the growth of the economic development and prosperity, in which project management is one of the components.

- Nation's economic development is powered by competitiveness.
- The competitiveness is powered by knowledge power.
- The knowledge power is powered by technology and innovation.
- The technology and innovation is powered by resource investment.

- The resource investment is powered by revenue and return on investment.
- The revenue is powered by volume and repeat sales through customer loyalty.
- The customer loyalty is powered by quality and value of products.
- Quality and value of products is powered by employee productivity and innovation.
- The employee productivity is powered by employee loyalty, employee satisfaction and working environment.
- The working environment is powered by management stewardship and sound project management.
- Management stewardship is powered by creative leadership.

For success in all projects we need creative leaders. Creative leadership means exercising the vision to change the traditional role from the commander to the coach, manager to mentor, from director to delegator and from one who demands respect to one who facilitates self-respect. I am sure all the institutions and the future aspiring institutions are spearheaded by creative leadership. For a prosperous and developed India, the important thrust will be on the growth in the number of creative leaders and innovative organisations who can create wealth through dedicated project management.

My best wishes to all the participants of this conference for success in the evolution of project management plan and its execution leading to economic prosperity of the nation.

Chartered Accountants – For Economic Health

I AM DELIGHTED to participate in the International Conference on Accounting Profession: Adding Value to New Horizons of Economic Growth organized by the Institute of Chartered Accountants of India (ICAI). My greetings to the organizers, office-bearers of ICAI, accountancy specialists, industrialists, economic planners and the distinguished guests. While I am addressing this audience I am aware that you are representing over 1,25,000 accounting professionals engaged in monitoring, protecting and promoting the economic health of our wealth generating institutions.

Over the years ICAI and its members have made a name for themselves in the development of discipline as well as standards of accounting. The Chartered Accountant community of India is one of the largest in the world. The 10th plan is focused on the agro-food processing and it is time that the ICAI gets interested in the agricultural sector as in the case of manufacturing and services. Can the Chartered Accountants formulate a model which can enable the value addition in the business of agriculture? Keeping in view the focus of this Conference, I would like to talk to you on the topic “Chartered Accountants: Partners in National Development”. In this connection let us discuss about our national challenges.

Our nation is going through a major challenge of uplifting of 260 million people who are below the poverty line and also to give better life for many millions who are on the border line of poverty or just above the poverty line. They need decent habitat, they need work with reasonable income, they need food, they need health care, and they need education and finally a good life. Our GDP is growing at

more than 7% per annum on an average, whereas, the economists suggest that to uplift the people from below the poverty line, our economy has to grow at the rate of 10% per annum consistently, for over a decade.

We have the mission of transforming India into a developed nation. For this we have identified five areas where India has core competence, for integrated action: (a) Agriculture and food processing; (b) Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country; (c) Education and Health care; (d) Information and Communication Technology; and (e) Self reliance in critical technologies.

These five areas are closely inter-related and will lead to food security, economic security and national security. Can the members of ICAI provide a business model for enhancing the momentum to our economic activity and enable us to realize the GDP growth rate of 10% and maintain it consistently for ten years from the existing 7%, through good governance and competitiveness, based on their experience in accountancy, auditing and financial management in the manufacturing and services sector?

It is essential that the benefits of the maximum portion of the fund allocated in government projects reach the intended beneficiaries. To realize this situation of bringing about higher yield from the projects, sanctioning authorities can seek the help of Chartered Accountants for simplifying the procedures. It will enable easier implementation of the project and assist the project leaders in providing robust and responsive methods of financial reporting for bringing about transparency and participation of all the stakeholders in the decision making process.

ICAI has acquired financial management experience for many decades within the country and abroad. One of the national challenges is: How do we get maximum economic benefit for the given investment? I believe this is your core competence. As you are thinking in terms of value maximization, I would like to suggest your participation in one of the very important national needs of the country. As you are

aware, recently the Employment Guarantee Bill has been passed by the Parliament and it seeks to provide better job security to the needy in two hundred rural districts by giving at least 100 days of guaranteed wage employment in every financial year to every household. There is a need to link the provision of this Bill to the integrated rural development programmes called Providing Urban Amenities in Rural Areas (PURA) as envisaged in the Bharat Nirman programme of the nation.

As per our estimates, bringing about rural prosperity would need at least 7000 PURAs (Providing Urban Amenities in Rural Areas) for the whole country. PURA envisages integrated connectivities, they are: physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through Internet kiosks; and knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes. These three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing of the products.

The members of the ICAI can work out a business plan for the PURA in their region for enabling it to be run by small scale industrialists located in the area. The accountancy training to the prospective entrepreneurs can be part of the overall entrepreneurial development programme organized by the local colleges in collaboration with the banking system. PURA enterprises can also undertake management of schools, health care units, vocational training centres, chilling plants, silos and building a market, banking system and the regional business or industrial units. Can the Chartered Accountants give the business and management plan for agricultural produce in all seasons so that the repeated revenue costs of fragmented efforts are avoided? There are several agri-based business opportunities like Jatropha, bamboo, sandalwood, durable localized speciality foods etc. New PURA enterprise needs partnership from the bank, the members of the ICAI, academic institutions, Government and also from the private entrepreneurs. An organisation for farmers, by the farmers, for farming, production and marketing is the need of the hour. What role can ICAI

play in evolution of such a plan of action based on their experience? Now I would like to discuss the changes which are likely to emerge in our society during the next decade and a half.

When the world was moving from the industrial to information and knowledge era, we witnessed a changing pattern in the sectoral share of GDP and the number of people employed in each sector. The share of Gross Domestic Product (GDP) percentage has undergone a considerable change. Contribution of agriculture to India's GDP has reduced from 39% to 22% during the period 1979 to 2004. During the same period contribution of manufacturing sector has moved up from 24% to 27% whereas the contribution from the services sector has increased from 37% to 51%. There has been considerable change in the employment pattern also. The percentage of people employed in agriculture has come down from 64% to 54%. Simultaneously, the percentage of people employed in manufacturing has gone up from 15% to 19% and in the service sector from 20% to 27%. This trend will continue and by 2020 our employment pattern expected is 44% in agriculture, 21% in manufacturing and 35% in service sectors. The displacement of 10% people from agriculture sector has to be compensated through skill enabling in the rapidly vanishing village specific intellectual property for undertaking value added products like durable foods, home remedies, etc. in the rural enterprises so that migration to urban area is reduced. ICAI has to create a model and work out methodologies through which the 10% people who are displaced from the agricultural sectors can be deployed fruitfully in the services and manufacturing sectors within the rural complexes either as self-employed entrepreneurs or members of small enterprises.

As per the data provided by the Reserve Bank of India there are approximately 12 million SSI Units in the country. Among these Units at least 6% are expected to be sick. What we require is, technological and skill upgradation, facilitating the market for the product, timely payment to the SSI by the major industries for the products supplied. The members of ICAI located in the region can take up the mission of upgrading some of the SSIs which are in difficulty and bring normalcy to them in collaboration with local entrepreneurs through a revival package. Also, the members of the ICAI can think of innovating a

simpler IT based accounting system to be followed by the small SSIs with minimum effort. This will be a very important societal mission since the SSI sector generates employment for a large number of rural citizens and is a wealth generator for the rural sector.

Now I would like to discuss the future challenges of the ICAI. The auditing always seems, to the common public, as a mechanism of exposing irregularities. Can the auditors suggest a transparent system with easy guidelines? In the world of computers, software developers use the process control mechanism which ensures that the software developed is nearly bug-free and the programmer is almost prevented from making mistakes. Since the world of computers and accounting are merging somewhere, can ICAI develop guidelines and process controls and checks, so that the irregularities will not enter into the financial management of enterprises? Some sectors like banking and manufacturing are already working with such systems.

India is aspiring to become one of the economic powers. This will call for the creation of several Indian multinationals across the world. We have been witnessing certain acquisitions of foreign companies by Indian industrial establishments. Similarly, we are witnessing a generation of borderless engineers and scientists working across many nations. Because of these changes, today an auditor must specialize in international business, accounting and auditing practices.

Just like software professionals benefiting from outsourcing, it is expected that the auditors and accountants of India would be the advisors and the actual implementers for many leading industries and establishments in the developing and the developed world. For this to become a reality, a near paperless accounting system which hinges on electronic cash and credit card transactions, will become the part and parcel of the business of a CA. Today in our computerization attempts the paper trail is still maintained for fear of mistrust and untested authentication mechanisms in the world of computers. Hence computerization has nearly become an act of impediment and we merely enter the paper transactions on the computers. This has to be changed in such a way that the transactions are born digital and automatically captured; we should spend more time on thinking rather than data

entry. Hence the fusion of ICT and auditing is essential.

When I am with the members of the ICAI, I realize that by virtue of your tasks, you have three unique experiences:

- (a) The professional auditing of all commercial organisations including public sector establishments.
- (b) Qualified members of ICAI after gaining experience have taken up the responsibilities of CFOs of enterprises.
- (c) Some members after serving as CFOs have assumed the leadership of certain enterprises as CEOs.

It means, the CAs have an integrated experience of auditing, financial advice and financial management and providing leadership to certain industries and establishments. I would like to suggest to you that with your long experience, you should bring out a book titled “ICAI experience of five decades in financial management towards National Economic development”.

Quality experiences of various auditors and auditing firms will definitely make this work a standard reference of accounting experience and bring out the vitality of the charter of duties of the institution.

Always there is one question in the minds of people whether auditing comes in the way of economic development. This book, what I am referring to, should bring out clearly that the auditing professional is indeed a partner in national development.

The members of ICAI have been contributing to the growth and the maturity of manufacturing and the services sector of the nation during the last fifty-five years. Now ICAI with their corporate experience should pay attention to the agriculture and rural development sector also. For enabling the above I have the following suggestions for the members of ICAI :

- (a) Creation of a productive linkage between the National Rural Employment Guarantee Bill 2005 and the Rural Development Programme.

- (b) Preparation of business plan for the PURA complexes spread in different parts of the country in consultation with the district authorities for execution by local entrepreneurs.
- (c) Training the local talent in basic accountancy practices through village knowledge centres being established in village Panchayats and provide consultancy to the village enterprises.
- (d) Take up the mission of upgrading a few SSI units and bring them back to normalcy through a revival package using local entrepreneurs. Also, development and implementation of IT based simplified accounting systems for the small entrepreneurs in the rural sectors.

Time has now come for the Chartered Accountants to elevate themselves from component audit to system performance audit. How are you going to prepare yourselves from now onwards for celebrating the year of completing the 100 years of service in auditing by the year 2049? Hence the vision of ICAI can be:

“ICAI will transform into a Financial Management and financial advice organisation with focus towards economic development of the nation and enhancing the growth of GDP in all three sectors of the economy.”

I am suggesting the derivation of the following missions for the next four decades leading to “Vision of ICAI 2049” for discussion in this Conference.

- (1) During auditing of the institutions, the value system of the institutions will be in focus, which means ICAI training must include ethics in action for the CAs in their business and in their personal life.
- (2) I suggest, that all the CAs before entering into the profession should take the following oath :

“I realize the profession I am entering is the trusteeship of financial management and I will assist whichever institutions I audit

keeping in view the societal obligations. I will not only bring out the problems of financial management for protecting the interest of all the stakeholders of the enterprise, but also suggest possible solutions with ethics as a way of life.”

- (3) CAs will consider their mission is the mission of the “National Economic Development.”

I inaugurate the International Conference on Accounting Profession: Adding Value to New Horizons of Economic Growth and wish the members of the conference success in their mission of being partners in the national development.

Auditing – A Quality Assurance Phenomenon

I AM DELIGHTED to participate in the All India Conference of the Accountants General organized by the Comptroller and Auditor General of India with the main theme “Linkages of Public Audit with Good Governance”. My greetings to the organizers, accountancy specialists, auditors, administrators, economic planners and the distinguished guests. While I am addressing this audience I am aware that you are representing nearly sixty thousand accounts and audit professionals engaged in monitoring, protecting and promoting all the economic activities of the Central and State Governments and the public sector institutions of the country.

The CAG has been continuously improving the audit system and they have brought in the concept of performance audit, which has added value to our system. The study of significance of the development programmes and pointing out the deviation, investigating their causes and suggesting better practices have improved the performance of certain systems. Today, the audit is going beyond mere economic aspects and it brings out evaluation of the efficiency and effectiveness of the government programmes. Also, during the last five years I understand that CAG has touched upon the major development initiatives of the Government in areas of health, education, urban employment generation, rural employment generation, food security, basic infrastructure creation and accelerated irrigation benefit programmes. Thus, I can see that the audit is becoming a partner in national development. I congratulate all the members of CAG for constantly striving to improve the feedback system provided to the

Government. The topic of my discussion today is “Public Audit and the National Mission of Developed India”.

I am aware that whenever you give an audit report, which gets transformed into an audit para and then a few result in oral evidence by PAC, a lot of hue and cry emanates stating that all the details have not been looked at. Sometimes it is due to political aspects. That is why I normally suggest that there should be system audit and not part audit. Some criticisms will always be there, when you bring out certain problems in the organisation. If your conclusions are built on sound arguments through established facts, and the results are going to assist the organisation, criticisms you can take them, as they are.

Let me give you an event-based experience of the missile programme which has similarity to the mission of CAG. When I see the audit and corrective action needed in the financial management field, I am reminded of technical events taking place in sequence in the case of flight trajectory. Let me refer to the launch of Agni missile system. It is a controlled and guided flight from the time of launch till it reaches the target at long range. At $t=0$, the time of launch, automatic launch control system gives the take off signal, after testing about 600 parameters in a few seconds. If all the parameters are within the specified error band, computer gives a go-ahead signal. Missile takes off. The Missile has an onboard computer that carries the specified trajectory which is to be followed by the missile from the time it takes off till it reaches the specified impact point. Any deviation from the trajectory is detected and quantified by the computer and fed continuously to the control system of the missile. The control system operates the fast reaction thrusters in all the three axes of flight and corrects the deviation and brings the missile to ride on the required trajectory in real time. If the corrective action is not done in real time, the missile will reach far away from the target and the mission will be a failure. Guidance and control with its onboard computer acts as the brain of the missile. During the flight of the missile, it is responsible to guide the missile to the target to meet the mission requirements and succeed. From this guided missile flight example I would like to share the following experiences:

- (1) It is necessary for the guidance and control system to monitor the deviation continuously on all the three axes and guide the missile to fly towards the target. The missile control system provides continuous feedback to the missile. This example reveals that the missile successfully reaches the target with the partnership of guidance and control system which is able to foresee the deviation and error and provide continuous correction. If the correction is provided after the event is over, you can see that the mission will not succeed. Similarly, if the auditors audit after the event is over or the mission is completed they will see many deviations but they are too late to correct. I am sure you can realize the importance of providing online corrections to the deviations.
- (2) In the missile development, 3000 engineers and staff work in the field of propulsion, aerodynamics, structures, guidance and control, instrumentation and flight simulation. The success of the flight comes out from system design, system integration, configuration management and system management. A dominant group called quality assurance and quality control group constantly works with the missile team to find the deviations of various sub-systems and systems online from design to development completion, so that the integrated missile performs to the mission specifications reliably. It is equivalent to system audit being carried out by the CAG.

I would like to illustrate a system how CAG can become a partner to a mission from the commencement of the project. Let us take second green revolution as a mission by the Agricultural Ministry as a model. Agricultural Ministry has a target of producing around 400 million tonnes of food grains by the year 2020 with reduced land, reduced availability of water and reduced human resource. Now let us identify the stakeholders. The stakeholders are farmers, agricultural scientists, meteorologists, agricultural planners, seed bank, water and irrigation system managers, organic and inorganic fertilizers manufacturers, chemical and bio-pesticides manufacturers, farm equipment lending agencies, co-operative banking system and financial

institutions, warehouses and godowns, procurement agencies, distribution system and the co-ordinating ministries from the Central and State Governments. The success of the mission is totally dependent on the synchronized integrated action between all the stakeholders and also the integrated planning, funding, scheduling and proper execution. Let me explain the various phases of this mission.

- (1) For enabling optimum production of food grains from the available land in different regions the first requirement is the availability of good soil. Once the characteristic of soil is known the seed (for a particular grain) and fertilizers can be matched to the soil. The first phase of the process would need identification of the land and the type of seed, which can be grown in the land, and the water availability.
- (2) The second phase involves preparation of the land, use of fertilizers leading to seeding and plantation. In this phase the essential requirements are availability of right quality seed at the right place, availability of farm equipment, availability of fertilizers, availability of funds through Agricultural Co-operative Banks and training to the farmers, transportation system for movement of resources to the locations. How do we ensure this? The availability of these resources from multiple stakeholders is the corrective action for the success of the mission.
- (3) The third phase involves weeding out, application of pesticides, timely irrigation, provision of supplementary nutrients for ensuring healthy growth of the plant. This is totally under the control of the farmer with the advice received from the agricultural scientists. The availability of the input such as water, pesticides, scientific inputs is required to be ensured in this phase.
- (4) The fourth phase involves harvesting, movement, storage, timely price fixation, procurement and distribution. In this phase we have to ensure that the produce is not affected by moisture and rain. Adequate storage facilities are available near the village in the form of small silos, medium silos

and big silos. Transportation system is available for moving the stores to competitive markets. The agricultural waste is also converted as product and sold. The procurement price and process needs streamlining at the right time to ensure that the farmer gets the right revenue for his produce. If there is surplus production there should be food processing agencies to convert it by value addition into marketable product without allowing it to perish.

All these four phases require fixation of targets, schedules and resource management plan and implementation. In these phases many of the actions are government driven, such as providing credit to co-operative banks and societies, provision of adequate quantity of fertilizers for distribution and marketing and supervision of the quality of seeds and fertilizers distributed so that the adulterated seeds are not used. Government through meteorological research data has also to announce the monsoon setting period since it has a direct bearing on the seeding time and a timely seeding is essential for ensuring good productivity of the crop. This is the open loop system with stakeholders from different organizations and different motivations. Successful realization of the yearly targets for meeting the goals of vision before 2020 will need co-ordinated functioning of all the phases of the process. CAG normally carries out the reviews after the task is completed. I would like the CAG to consider at what point CAG team can enter into the system so that they can make effective contribution to the agricultural mission involving farmers, government supported co-operative banks, co-operative societies, government funding and agricultural experts.

Now I would like to discuss the future challenges of the CAG. The auditing always seems, to the common public, as a mechanism of exposing irregularities. Can the auditors become like partners in a partnership firm? I am sure this is possible since both the executives and the audit are working for the common cause, i.e. delivery of good governance to the citizens. Transparency is the key to good governance and you can play a very important role in designing guidelines. In the world of computers, software developers use the process control mechanism which ensures that the software developed is nearly bug-

free and the programmer is almost prevented from making mistakes. CAG can perform the same role by developing process controls, guidelines and checks for auditing in the IT environment so that the irregularities will not enter into the financial management of government and public sector institutions.

The application of ICT into the audit system should enable the auditors to ensure the process control mechanism is built into the auditing system. This system would ensure the performance metrics of various domains such as strategic planning, project management, operational management, risk management practices, business continuity planning, quality of service delivered, and customer satisfaction. Also it should meet the desired objective of the Government and public sectors. If the auditors associate themselves with the executives in their e-governance or IT related programmes then it provides credibility and assurance to the stakeholders (in our case the citizens of the country) about value for money. CAG team will also be assured of security within the system, compliance of standards, existence of proper process controls accuracy and integrity in the output.

Now I would like to discuss about the E-Governance system being developed in the Rashtrapati Bhavan with active co-operation of finance and audit. The e-Governance provides an avenue for making the Governmental transactions, be it Government to Government (G2G) or Government to Citizen (G2C) completely transparent.

Two years back, we undertook an exercise to completely automate the transactions of the Rashtrapati Bhavan both G2G and G2C and introduce e-Governance. Today, I am very happy to inform you that due to the concentrated work of my colleagues at Rashtrapati Bhavan we have a fully functional and automated system for information and workflow of varying levels of secrecy – for example secret communication from any Government Department to President's Office to very simple day-to-day letters and messages from the citizens, and financial transactions. We have involved our integrated finance and audit professionals while working out the total work flow system and the design and development of MIS system so that the necessary process controls mechanism and business rules which will ensure the system

is audit compliant. The software is currently undergoing field trials. We would be launching fully tested and validated user friendly e-governance software shortly. I visualize the interactions and communications between the various organs of the Governments with President's office will take place through this e-governance Grid.

You can think of establishing a secured CAG e-governance grid through VPN broadband network with your clients namely Central and State Governments and Public Sector Institutions. In an IT enabled environment, a near paperless accounting system which hinges on electronic cash and credit card transactions including authenticated and secure digital signature will have to become the part and parcel of the business of CAG. Today in our computerization attempts the paper trail is still maintained for fear of mistrust and untested authentication mechanisms in the world of computers. Hence computerization has nearly become an act of impediment and we merely enter the paper transactions on the computers. This has to be changed in such a way that the transactions are born digital and automatically captured; we should spend more time on thinking rather than data entry. Hence the fusion of ICT and auditing is essential with the digital signature in primary key infrastructure environment. When the banks and the commercial establishments are now engaged in the e-commerce transactions in India, I do not visualize any difficulty in implementing similar scheme in Government departments with qualified encryption standards.

For enabling the e-audit through the e-governance grid the ICT tools needed are on quality control, e-auditing system, project management, change management, risk assessment and control, human resource planning, implementation of near paper-less office work flow system and performance tracking system. This will enable the audit team to provide online process control enablement through monitoring of the time PERT, cost PERT and the performance PERT and recommend suitable corrective actions for meeting the final project goals to all your customers when the process is in progress. This type of paradigm shift in the approach through auditing will make the institution of CAG a partner in all our time-bound national missions.

CAG has earlier conducted audit of rural employment generation programme. The performance audit of Jawahar Rojghar Yojana disclosed that the scheme suffered from shortcomings in the critical areas of targeting, inadequacy of provision of funds, fictitious reporting and lack of evidence of employment generated. Presently one of the national challenges is: How do we get maximum economic benefit for the given flow of fund? I believe this is the core competence of CAG. As you are thinking in terms of value maximization, I would like to suggest your participation in one of the very important national needs of the country. As you are aware, recently the Employment Guarantee Bill has been passed by the Parliament and I have approved it. This Bill seeks to provide better job security to the needy in two hundred rural districts by giving at least 100 days of guaranteed wage employment in every financial year to every household. How to make this programme successful based on your earlier experience? There is a need to link the provision of this Bill to the integrated rural development programmes called Providing Urban Amenities in Rural Areas (PURA) as envisaged in the Bharat Nirman programme of the nation. This is the right time for CAG to provide e-governance based audit support system to the Central and State Governments so that the shortcomings which were noticed in the earlier scheme of rural employment generation does not get repeated. Let me now discuss audit in the world of e-commerce.

Our audit system had grown with checks and balances and has evolved over many years. But things are changing. The world is fast embracing the E-Commerce and very often one has to deal with faceless entities such as a web site. In this world of E-Commerce, both good and the evil coexist. While the advantages of speed and efficiency cannot be questioned, the frauds are also equally possible. The money can be transferred at blinding speeds and often without an acknowledgement or a trace. In India, E-commerce is in a nascent stage. But it would very soon become a major part of our transactions. It would be necessary for the auditors and accountants to generate a policy statement on the Best Practices for E-Commerce for the country in partnership with experts. It has become all the more important since some of our public sector institutions are becoming multinationals, having assets and business in different countries.

Many Indian Government organizations today set up and acquire companies abroad. The rules and regulations and the laws in those countries may be different. What is ethical in one country may be unethical in ours. The auditors and accountants must become specialists in international trade and accounting practices and should be able to seamlessly integrate our practices with the countries with which we trade. Sooner or later, we will see accounting in a borderless world.

The members of CAG have been contributing to the growth and the maturity of the governance system during the last fifty-five years. For enabling members of the CAG to become partners in national development, I would like to make the following seven suggestions for your discussion.

- (1) The audit teams can work with Programme Chiefs or Executives of national programmes or projects from the inception of the project and participate in the study of the PERT of the project. You will find that there may be ten to fifteen critical paths for a ten year programme and for five year projects it may be more. The critical paths in the project PERT will be the CAGs Audit area and points.
- (2) The aim of the audit should be to detect the deviations in near real time when the project is in progress and provide constructive solutions so that the objective of the project is met well in time.
- (3) CAG's experience in the performance audit of Jawahar Rozgar Yojna should be shared with the Rural Development Ministry, which will enable them to take suitable proactive corrective action while implementing the Rural Employment Guarantee Scheme 2005. This will ensure that minimum ninety percent of the funds reach the intended beneficiary.
- (4) Audit can assist some establishments in disposing of certain inventories of system of old technologies. Continuous retention of these systems of old technologies will involve inefficient use of the existing human resource and come in the way of the growth of the organization. Some of the examples are use of manual drafting system and conventional

lathes and milling machines vis-à-vis modern CAD/CAM system which will enable direct drafting and feeding of the component into the machine for realizing the product.

- (5) CAG may consider creation and maintenance of a centralized national asset register. The salient features of the asset can be put on the website for public awareness. Periodically the status of the asset may be reviewed and updated since CAG is the custodian of national wealth. This is indeed a big mission and challenge.
- (6) CAG may consider incorporating a mutually agreed online audit system for high value schemes of national importance such as rural employment scheme, PURA, golden quadrilateral, large power plants so that maximum value for money is realized in a time-bound manner.
- (7) Audit should be sensitive to the fact that E-commerce and a borderless world would soon be a reality. You have to evolve a policy statement on this issue.

Auditing in the modern sense is a quality assurance phenomenon. It has to move from the conventional quality control mechanism to quality assurance of institutions through the establishment of internal controls and self-controls. Audit has to be proactive and alert the system before occurrence of low performance. Implementation of e-Governance System in Audit is essential that will assist the CAG for enabling on line process control and guidance to its offices, Accountants General and clients. This will create close interaction between the auditors and clients as partners contributing to a common goal for providing effective governance to the nation in time. Apart from the planned audit CAG teams must be observant and be able to detect areas of immediate national concern and find urgent solutions through timely intervention.

I inaugurate the All India Conference of the Accountants General and my best wishes for success in your mission of providing positive contribution towards national development.

Bharat Nirman – Building Infrastructure in Rural areas

I AM DELIGHTED to participate in the inauguration of the National Workshop on “Vision 2020 – India” (PURA as Growth Centres for Making India a Developed Nation). My greetings to the Voluntary Health, Education and Rural Development Society (VHERDS), Housing and Urban Development Corporation, New Delhi and Indian Institute of Technology (Delhi) for taking the initiative in organizing this workshop. I also greet the planners, administrators, scientists, industrial organizations, social organizations, academicians and other participants.

Presently, the annual GDP growth rate of the nation is around 7% to 8%. There is a need to increase the growth rate of the GDP by additional 2% a year for transforming India into a developed nation and making the number of people below the poverty line to be near zero, and for this we need to progressively implement the PURA programme in different parts of the country. As you are aware, the number of PURAs required to be brought out in the whole nation is around 7,000. During this workshop many of you will be talking about the PURA. However, I would like to discuss about the enabling environment provided by the Government, some of the PURA models available in different parts of the country and the PURA components, which will enable large-scale provision of employment in the rural sector. I would like to talk to you on the topic “Development Ambience: PURA as an instrument”.

The Union Government has evolved the Bharat Nirman as a four-year business plan for building infrastructure, especially in rural India. It will have six components, namely, irrigation, roads, water supply,

housing, rural electrification and rural telecom connectivity. The broad goals of Bharat Nirman would be:

- bringing an additional 10 million ha of land under assured irrigation,
- providing road-connectivity to all villages having a population of 1000 (or 500 in hilly/tribal areas),
- constructing 60 lakh additional houses for the poor,
- providing drinking water to the remaining 74,000 habitations that are uncovered,
- reaching electricity to the remaining 1,25,000 villages and electricity connections to 23 million households, and
- Providing telephone connectivity to the remaining 67,000 villages.

The programme has been estimated to cost Rs.1740 billion (Rs. 1,74,000 crore) and is to be completed in the next four years. The government has allocated an additional Rs.250 billion (Rs 25,000 crore) for social sector programmes during the current financial year. Bharat Nirman will involve Panchayati Raj Institutions in its planning and implementation. The challenging task here is the evolution of the management structure for a mission mode operation through PURA where an integrated development is possible.

Bankers have agreed to increase the agriculture and agro processing credit to Rs.2000 billion (Rs.2,00,000 crore) from the existing Rs. 900 billion (Rs. 90,000 crore) within the next three years in phases. This will include advances for setting up of PURA complexes and small enterprises in PURA clusters.

Also, to take care of those who are likely to be left behind by development processes and to ensure that there is a safety net, especially in some of the more backward regions of the country, Central Government has come forward with a National Employment Guarantee Bill. This bill provides legal guarantee for at least 100 days of employment to at least one person in every poor household initially

in some of the most backward districts of the country. This programme is to be gradually expanded to cover all rural areas. I have suggested that there should be a direct linkage of the infrastructure tasks required for the PURA with the Guaranteed Rural Employment Scheme.

The Government has decided to grant greater autonomy to the National Highways Authority of India while taking steps to make it more professional and efficient. The rate of completion of road construction under the national highways programme, especially the Golden Quadrilateral and the North-South and East-West corridors, has been speeded up. The Government will encourage public-private partnership in all infrastructure projects. Special focus will be given to improving rail and road connectivity in the North-Eastern region.

Government has plans to increase India's tele-density from the present 10% to more than 20% by 2008. The priority will be to provide both voice and data transmission connectivity in rural areas. The broadband policy announced recently would enhance Internet connectivity with increased speed. This, in turn, would help our rural areas to take advantage of the benefits of e-governance, e-education and e-health.

Recently two members from TCS gave a presentation on the potential of biogas plants in our rural sector. They had conducted a survey in Andhra Pradesh and Tamil Nadu to determine the current levels of feed stock and energy needs. The survey indicates: adequate feed stock biomass is available for biogas plants and adequate plant biomass is available for gasification plants for electricity generation. Most of these resources are presently being wasted or sub-optimally utilized. Activities like collection of feed materials, operation of plants, maintenance and distribution of biogas and electrical energy and other manual activities will result in local employment making these villages employment and service hubs. In addition biogas plants will also provide organic manure for farmers.

Preliminary estimates indicate that a village with a population of thousand people will require a biogas plant of 200 cubic metre and an electricity generator of 200 KWs. The capital cost is estimated at

Rs. 25 lakhs for biogas and Rs. 44 lakhs for gasifier and electricity generating plants. With this capital cost the cost of biogas works out to Rs.14 per kg compared to the current price of Rs. 20 per kg of LPG and electricity at Rs. 2 per Kwh, which is less than the grid power cost. Each PURA cluster can have the biogas plants based on their specific needs.

Recently, I came across a total sanitation programme organized at Gandhi Nagar town Panchayat in Vellore district. Here the Panchayat authority in collaboration with non-government organization has been able to segregate the waste into organic and inorganic items. They have created men self-help groups and women self-help groups for managing the waste in the Panchayat. These groups have established roadside dustbins, which are being cleared regularly. They also have special services for hotels and marriage halls. The drainage system in the village is being cleared thrice in a week. The fault reporting system is so efficient that sanitation faults in the village are attended to and rectified within the same day. A village having 2,400 families generates garbage of over 48 tonnes per year. This garbage is converted into manure and recyclable waste generating over Rupees three lakhs in revenue. All the 2,400 families in the village are able to have a clean green village just by paying around ten rupees per month per family. The scheme provides employment to around thirty-six members who are paid employees of the Panchayat. Part of the funds required for the payment of these employees is generated by the sale of manure and recyclable waste. This appears to be a self-generating system and is economical. Many of the PURA complexes in the country may like to follow such examples for economic benefits and keeping the rural setting clean, tidy and disease free.

In August 2004, I had visited Keerapalayam Panchayat in Cuddalore district, Tamil Nadu. When I was discussing with the Panchayat Board office-bearers, I found that every one of the 1,125 dwelling units in the Panchayats had sanitary facilities. Also it was interesting to find that the women in the village had acquired masonry and plumbing skills and they had been responsible for constructing the household toilets. They not only constructed toilets for the houses

in their Panchayats but also went to neighbouring villages and provided this facility on an entrepreneurial basis. This method has provided employment opportunities to the women and also enabled the Panchayat area to be clean, tidy and free from diseases arising out of poor sanitary conditions. Similar effort has been reported from Tamarai Kulam Panchayat, Ramanathapuram District.

Now I would like to discuss some of the operational PURAs functioning in Tamil Nadu, Maharashtra and Madhya Pradesh. They are efficiently run by the private, social organizations and institutions.

I had visited Periyar Maniammai College of Technology for Women and inaugurated a PURA Complex a year back. I thought of sharing with you the developmental concept of a cluster of over 60 villages near Vallam, Thanjavur district of Tamil Nadu that involves a population of 3 lakhs. This PURA complex has all the three connectivities - physical, electronic and knowledge - leading to economic connectivity. The centre of activity emanates from the women engineering college that provides the electronic and knowledge connectivity. Periyar PURA has health care centres, primary to post-graduate level education and vocational training centres. This has resulted in large-scale employment generation and creation of a number of entrepreneurs with the active support of 850 self-help groups. Two hundred acres of waste land has been developed into a cultivable land with innovative water management schemes such as contour ponds and water sheds for storing and irrigating the fields. All the villagers are busy in cultivation, planting *Jatropha*, herbal and medicinal plants, power generation using bio-mass, food processing and above all running marketing centres. This model has emanated independent of any government initiative. The committed leadership has been provided by the engineering institution. This gives me the confidence that PURA is a realizable proposition and this movement can be multiplied by thousands of entrepreneurs, educational administrators, small-scale industrialists and bankers with the support of the government agencies.

Recently, I visited a place called Loni in Maharashtra where a participative model of integrated rural development has come up among

44 villages with the population of 80,000. The architect of this model Shri Bala Saheb Vikhe Patil, MP of Maharashtra has a vision of improving the productivity of the rural people through improved quality of life with health care, education and employment. The concept is people-centric development for social transformation. The thrust area of development has been on comprehensive Medicare particularly for women and children, need-based health education and e-connectivity to the farmers. The complex has created 27 educational and vocational institutions consisting of schools, colleges, polytechnic and ITI including medical and engineering colleges. They have created a sugar factory, biogas plants, chemical plants and power projects. They have a large number of self-help groups for providing low interest loan for the weaker sections in the society. Due to the co-operative effort of the people, literacy in these villages has gone up from 63% to 83%, birth rate has come down, infant mortality rate has decreased to 35 per 1000 from 70 per 1000 and the standard of living of the people has gone up by over 20% compared to other villages in the neighbouring areas.

Recently I visited Chitrakoot in Madhya Pradesh, where I met Shri Nana Deshmukhji (age 90) and his team members belonging to Deendayal Research Institute (DRI). DRI is a unique institution developing and implementing a village development model, which is most suited for India.

DRI understands that people's power is more potent, stable and enduring than political power. By becoming one with the oppressed and depressed, one gains the acumen of administration and governance. Social advancement and prosperity are possible only by injecting the spirit of self-reliance and excellence in the younger generation. Using this principle, DRI has plans to develop one hundred clusters of villages having approximately five villages each around Chitrakoot. They have already developed 80 villages in 16 clusters consisting of about 50,000 people.

I visited one of the villages called Patni where the institute has promoted sustainable development based on indigenous and traditional

technology, knowledge systems and local talents. The research work by the institute through field studies facilitates the development of replicable and tangible model for achieving self-reliance in villages. The programme aims at income generation through value addition, innovative agricultural practices, inculcating scientific temper among the villagers, improvement of health and hygiene, striving towards 100% literacy. As a part of integrated rural development, the villagers are doing water harvesting; effectively use it for cultivation of food grains, medicinal and aromatic and horticulture cultivation. Apart from all these development activities, the institute is facilitating a cohesive conflict free society. As a result of this, I understand that the eighty villages around Chitrakoot are almost litigation free. The villagers have unanimously decided that no dispute will find its way to court. The differences will be sorted out amicably in the village itself. The reason given by Nana Deshmukhji is that if the people fight among each other they have no time for development. They can neither develop themselves nor the community. This message has been understood by the society and they have decided not to embark on any fighting. All these have been accomplished through DRIs “samaj-shil-pi dampati” (a graduate married couple) a new concept of counselling and intervention promoted by DRI. It was a great joy for me to take lunch with Patni village citizens. A new road connecting multiple villages in the Chitrakoot area is taking shape. In the same Chitrakoot environment there is another social organisation called Shri Sadguru Seva Sangh trust carrying out a number of social activities including the running of quality eye care centre. In a rural environment, I find a revolution is taking place due to the committed leadership to remove the human pain.

During my discussion with the Vice Chancellors of the 150 years old universities of Kolkata, Chennai and Mumbai on 3rd October 2005, they have agreed to implement a PURA complex each at Diamond Harbour region of West Bengal by Faquirchand College; Chengalpattu region in Tamil Nadu by Vedachalam Government Arts College; and Palghar region in Thane district, Maharashtra by Sonopant Dandekar Arts, Science and Commerce College. In addition, with the foundation

of spiritual awakening gained from Akshardham, the volunteers of Akshardham have agreed to enrich the nation through commissioning of 1000 Akshardham PURAs (Providing Urban Facilities in Rural Areas) in different parts of the country within the next 5 years under the inspirational leadership of His Divine Holiness Pramukh Swamiji Maharaj.

Dear friends, the message so far I have given you is: there are many non-governmental institutions taking initiatives in developing PURAs. The Government institutions like Urban development ministries, IITs and the organizations who are present here today may participate in this effort.

Let me also highlight some independent initiatives that will become important components of PURA and can become employment generators in the rural areas.

Government has decided to permit mixing of 10% bio-fuel with diesel. Southern Railway is using 100% bio-fuel for running heavy vehicles like trucks, cranes, forklifts, jeeps and tractors. This has opened up new opportunities for employment and wealth generation. We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland have been allotted for tree plantation. Certain multi-purpose trees such as *Jatropha* can grow well in wasteland with very little input. Once grown the crop has fifty years of life. Fruiting can take place in this plant in less than two years.

It yields oilseeds up to five tonnes per hectare per year and produces two tonnes of bio-diesel. Presently, the cost of bio-diesel through the plant is approximately Rs. 17 to Rs. 19 per litre, which can be substantially reduced through choice of right size of the plant and using high yield variety plantation. Bio-diesel plants grown in 11 million hectares of land can yield a revenue of approximately Rs.20,000 crore a year and provide employment to over 12 million people both for plantation and running of the extraction plants. This is a sustainable development process leading to large scale employment of rural manpower. Also, it will reduce the foreign exchange outflow paid for

importing crude oil, the cost of which is continuously rising in the international market. Moreover, use of bio-fuel is carbon neutral. This oil can also be used for soap and candle industries. De-oiled cake is a raw material for composting. Also *Jatropha* plantation provides a good environment for honey production. We should absorb best of the technologies available worldwide and start commercial operation soon, instead of staying at pilot plant levels. I would request the industrial community assembled here to take the initiative, generate detailed project report in collaboration with technical agencies such as The Energy and Research Institute (TERI), TNAU and Agriculture university in Anand, on this project and promote entrepreneurs with financial support from the banks in rural areas who can undertake the plantation and commissioning of extraction plant leading to production of cost-effective bio-fuel. Can there be a better project than this for coherent development of our rural sector and sustainable business proposition for industry?

Textile industry is very important for the Indian economy. The basic raw material is cotton. India is the third largest producer of cotton in the world. However, compared to the world average of 700 kgs of seed cotton per acre, we produce only 350 kgs of seed cotton per acre. It is indeed a technological concern for the nation. Some of the industries have adopted a village in Punjab, which has brought out a co-operative movement of the farmers, scientists, trainers and the industry and launched for cultivating cotton in over 1200 acres. A training programme was launched for farmers starting with soil characterization, matching the cottonseed to soil, water and fertilizer management.

The project resulted in increasing the average seed cotton yield of the village from 450 kg per acre to 950 kg per acre. This led to the sevenfold increase in net return per acre, due to considerable reduction in input costs. It is worth noting that in this case the yield is above the world average. This model has already been replicated in twenty five villages in Punjab. The revenue increase due to higher production in these twenty-five villages is around Rs. 20 crore. Certainly many cotton-growing regions of the country can emulate this model. India can

definitely produce 25% of the total world production of quality cotton compared to the existing 12% leading to revenue of over Rs. 25,000 crores a year for the nation.

I would like to link cotton production to garment export business, which is a low investment and large volume employment generator. India is presently exporting six billion dollars worth of garments, whereas with the WTO regime in place, we can increase the production and export of garments to 18 to 20 billion dollars within the next five years. This will enable generation of employment in general and in rural areas in particular. By tripling the export of apparels, we can add more than 5 million direct jobs and 7 million indirect jobs in allied sector, primarily in the cultivation of cotton. Concerted effort is needed in cotton research, technology generation, transfer of technology, modernization and upgrading of ginning and pressing factories and aggressive marketing strategy.

As you are aware, the use of coal for power generation results in increased quantum of fly ash production, which has reached about 100 million tonnes per year. All-out efforts are needed to utilize this fly ash not only from environmental considerations, but also to avoid land usage for fly ash dumping. Though there has been a steady progress in fly ash utilization from 1990, we have a long way to go to reach the target of 100% fly ash utilization. It is reported that the agricultural increase of grains is around 15%, green vegetables 35% and root vegetables 50%, when fly ash is mixed with the soil. Toxicity tests have proved that there is no toxic element due to fly ash. But it has higher nutrients due to increased availability of iron and calcium. The fly ash can become a wealth generator by making use of it for producing “green building” materials, road, in agriculture etc. Presently, the fly ash utilization is in the range of 33 million tonnes per year and providing employment for over 50,000 personnel. Full utilization of the generating stock will provide employment potential for 300,000 people and result in a business volume of over Rs. 4000 crore. Many PURA clusters located near the thermal power plants can make use of fly ash as a business proposition.

With the kind of awareness and opportunities available in ICT, it will soon become a reality wherein every one of our villages will have computers and connectivity available. These would be the window to the world of knowledge for our villages and also to reap the benefits of our e-governance, tele-education, tele-medicine, e-commerce and e-judiciary initiatives. In spite of the all pervasive nature of the computers, they would still be far away from being a truly friendly access system for our villagers. We would need in such cases, a human intermediary who would act as the village information officer. He will be the extended eyes and ears of the villager to the world of knowledge. India has approximately 2.3 lakh Village Panchayats. I visualize establishment of village knowledge centres in these Panchayats to empower the villagers with the knowledge and to act as a nodal centre for knowledge connectivity for the villagers. Village Knowledge Centres become the delivery mechanisms, which provide the knowledge connectivity from the domain service providers to villagers in the PURA Complexes. The knowledge centre from which the villagers would access the information through the village information officer can also be used for collection, digital storage and dissemination of village-specific information pertaining to any relevant information to the villagers. This will provide direct quality employment to over one million who will be instrumental in promoting higher level of wealth generation in PURA Complexes.

As you are aware we have been talking about PURA (Providing Urban Amenities in Rural Areas) as a growth driver of our economy for the last few years. Also a number of conferences have been held by different institutions for conceptualization and implementation of PURA. Time has now come for consolidating all the thoughts, which have emerged in the development of PURA by different agencies. Also, we should realize that the Government has made a number of enabling provisions for growth of PURAs in different regions. Now is the time to work out and embark on the development of specific PURAs in every State. Certain State Governments like Chattisgarh have taken the lead and created viable PURA models. There is a need to consolidate all these experiences and launch at least 100 PURAs

before the end of 2006 by the collaborative effort of societal organizations, educational institutions, bankers, industrialists, entrepreneurs and the Government. I would suggest that the participants of this workshop formulate a plan of action for preparing detailed project reports of the hundred PURAs within the next six months and launch the PURA complexes in phases during the second half of 2006. I will be most willing to launch a few PURAs planned by the members participating in this workshop. We must remember that workshop and conference phase is now over and we are in the implementation phase of the PURAs.

My best wishes to the participants of this seminar in the task of implementing PURA in the mission mode.

Transforming Vision to Missions

I AM INDEED delighted to be here in this distinguished gathering at the Centenary celebrations of the PHD Chamber of Commerce and Industry. My greetings to the members of the PHD Chamber of Commerce and Industry, distinguished guests and participants of this event. I studied the type of corporate members with the 40,000 small, medium and large manufacturing units spread all over the Northern Region covering 11 states and you are contributing towards 40% of the national exports and the manufacturing output. PHD Chamber of Commerce and Industry is also actively involved in the rural development and family welfare sectors. The area of your mission is indeed important for India in the multiple sectors of the economy. I was thinking what thoughts I can share with you, since the chamber has been thematically focusing on “India – Vision 2020” during the centenary year and naturally, you will also be interested in the business opportunities, industrial challenges and above all the investment environment. Hence, I would like to discuss with you on the topic “Transforming Vision to Missions”.

In the Indian history, very rarely our nation has come across a situation, all at a time, an ascending economic trajectory, continuously rising foreign exchange reserve, reduced rate of inflation, global recognition of the technological competence, energy of 540 million youth, umbilical connectivities of 20 million people of Indian origin in various parts of the planet, and the interest shown by many developed countries to invest in our engineers and scientists including setting up of new R&D centres. Above all India as the largest democracy in the world has a reputation for its democracy and for providing leadership for the one billion people with multi-cultural, multi-language and multi-

religious backgrounds. And also our technological competence and value systems with civilizational heritage are highly respected. Also, FII's (Federated Investors, Inc) find investing in India attractive. Indians are also investing abroad and opening new business ventures. As per the report titled "From the Ganges to the Thames" which states that the Indian Foreign Direct Investment in British capital is second only to that of the US, and Indian FDI project in Europe has increased from just 5 to 119 during the period 1997 to 2004. The Government is also committed to economic development by ensuring growth rate of 7% to 8% annually, enhancing the welfare of the farmers and workers and unleashing the creativity of the entrepreneurs, business persons, scientists, engineers and other productive forces of the society. Can we expect anything better than this for increasing the momentum of our development missions and economic growth? Let us translate this great opportunity for transforming India into a Developed nation before 2020. This calls for the agriculture, manufacturing and service sectors becoming globally competitive leading to economically competitive. Then the following competitive profile will emerge that will create more opportunities to the corporate sectors working in India.

1. A Nation where the rural and urban divide is reduced to a thin line.
- 2 A Nation where there is an equitable distribution and access to energy and quality water.
- 3 A Nation where agriculture, industry and service sector work together in symphony, absorbing technology thereby resulting in sustained wealth generation leading to greater high value employment opportunities.
4. A Nation where education is not denied to any meritorious candidates because of societal or economic discrimination.
5. A Nation which is the best destination for the most talented scholars, scientists, and investors from all over the world.
6. A Nation where the best of health care is available to all the billion population and the communicable diseases like AIDS/TB, water and vector borne diseases and other stress diseases,

cardiac diseases, cancer and diabetes are brought down.

7. A Nation where the governance uses the best of the technologies to be responsive, transparent, fully connected in a high bandwidth e-governance grid, easily accessible and simple in rules, thereby corruption free.
8. A Nation where poverty has been totally eradicated, illiteracy removed and crimes against women are absent and the society feels unalienated.
9. A Nation that is prosperous, healthy, secure, peaceful and happy and continues with a sustainable growth path.
10. A Nation that is one of the best places to live in on the earth and brings smiles on a billion plus faces.

It is indeed a challenge of high magnitude. For achieving such a competitive profile for India, we have a vision of realizing this goal in a time-bound manner.

Our nation is going through a major challenge of uplifting of 260 million people who are below the poverty line and also giving better life for many millions who are on the border line of poverty or just above the poverty line. They need a decent habitat, they need work with reasonable income, they need food, they need speedy access to health care, and they need education and finally they need a good life and hope for a better future. Our GDP is growing at more than 7% per annum on an average, whereas, the economists suggest that to uplift the people from below the poverty line, our economy has to grow at the rate of 10% per annum consistently, for over a decade.

To meet the need of one billion people, we have the mission of transforming India into a developed nation. We have identified five areas where India has a core competence for integrated action: (1) Agriculture and food processing, (2) Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country, (3) Education and Health care, (4) Information and Communication Technology, and (5) Strategic sectors. These five areas are closely inter-related and if properly implemented, will lead to food, economic and national security of our country.

Emphasis should be on full utilization of natural and human resources of the nation to meet the demands of the modern society. We should also remember that about 50% of our population is young people with aspirations for better living. Value addition in agriculture, manufacturing and service sectors, building the national core competence and technologies will lead to additional high income employment potential. The engines for growth will be accelerated by launching of the five national missions, viz. water, energy, education and skills, infrastructure and employment generation. The totality of these five missions will enable achievement of 10% GDP growth rate per annum. It is possible to do so with ecological and economic sustainability. It is not the mission of governments. It is a collective effort of big and small businesses, science and technology and academic institutions, foreign investors, and many others who have confidence about India.

With these aspects in view, we have already laid down the road map. The priority for the government is to convert the road map into various missions. It is to be done in a decentralized manner allowing a greater role for private enterprise and local initiatives. While converting the vision into different missions we seem to have many thoughts and variety of routes to reach the goal. This is where there is a need to have a coherent thinking among all the members of the society, including the legal and other agencies. All of us have to think that the nation is greater than an individual or an organization. All of us should believe, that “we can do it”.

Let me now discuss some of the national missions that India is giving thrust to for achieving sustainable economic development for all the regions of the nation. I am sharing these missions with the members of PHD Chamber of Commerce so that you may like to participate in developmental process of the nation. First, I would like to discuss about PURA.

The number of PURA units for the whole country is estimated to be 7000. This envisages integrated connectivities to bring prosperity to rural India. These are - physical connectivity of the village clusters through quality roads and transport; electronic connectivity through

tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through Internet kiosks; and knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes. These three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing of the products.

Each PURA cluster will connect about 20 villages depending upon the region and population and will cost about Rs.100 crores (~\$20 million). After initial short-term employment during construction etc., we have to plan for initiating actions for providing regular employment and self employment opportunities in nationally competitive small enterprises in agro processing, manufacturing and services sectors for about 3000 people. If the industrial/business parks are marketed well, they can generate employment opportunities in support sector for about 10,000 people in that cluster. This will provide sustainable economy for the rural sector. In this national mission, bankers can promote entrepreneurship in the rural areas. This will lead to the removal of urban-rural divide. This experience can become a model for other countries to follow.

A large number of banks have entrepreneurial development programmes. Banks have also been funding Small Scale Industries of different types in various regions. The small scale industrialist is a promising candidate for becoming the chief executive for managing the PURA complexes in an integrated way. PURA enterprises can also undertake management of schools, health care units, vocational training centres, chilling plants, silos and building a market, banking system and the regional business or industrial units. A new mission mode management style has to emerge for PURA enterprises. It should not be looking for protective legislations to support them. Rather they should be efficient to compete with others. This new PURA enterprise needs partnership from the bank, from the Government and also from the private entrepreneurs. Banks can train the entrepreneur for managing the PURA in their training centres and also provide them loans for creating and running PURAs as a business proposition.

As known to all the experts assembled here, India is now producing about 200 million tonnes of food grains, as a result of the first green revolution piloted by the political leadership of Shri C. Subramaniam, the scientific leadership of Dr. M.S. Swaminathan and willing farmers. India has now embarked on the Second Green Revolution which will enable increase in productivity and diversification of the agricultural sector. The second green revolution will have the farmers in focus, farming technology as the friend, food processing and marketing as partners and the consumers as customers. From now on to 2020, India will gradually increase the production to around 400 million tonnes of grains. The increase in the production will have to be done under the reduced availability of land from 170 million hectares to 100 million hectares with reduced water availability. We should also learn to diversify to meet specific consumer preferences, export markets and also in the interest of ecological balance. This is to be achieved through information access to all stakeholders and not with central controls or restriction of movements of agro products.

In addition to this, there is a large potential in medicinal, floriculture and aromatic plants in view of the large bio-diversity potential of India. We have to aim at two billion dollar export potential for all the three areas including orchids which can grow naturally in north-east regions of the country.

Now let me discuss about the potential of ICT sector in India. Today the software industry in India is nearly 28 billion dollars (\$18 billion Export and \$ 10 billion Domestic Market) contributing to nearly 24% of nation's exports. This is through IT services and ITES-BPO sector, which accounts for around 3.5 % of the global market. India's core competence is in the area of IT services and IT Enabled Services (ITES) - Business Processing and Outsourcing (BPO). The business volume in these two sectors alone accounts for \$850 billion. India's first aim is to capture at least 15% of the global business volume in these two sectors, which is expected to be around 1.2 trillion dollars by 2008. The market share of the Indian software industry in IT services, ITES, and BPO alone should be around 200 billion dollars by 2008.

I consider this can be achieved, since our university system is contributing over three million graduates including Engineering graduates every year. This is a vital resource needed for growth in the IT services, ITES and BPO. Now what is needed is the infrastructural establishment such as IT parks including call centres in large numbers for providing the services which can be established by our IT companies and the state governments. We should aim at increasing the knowledge pool to 5 million Indian youth by the year 2008, which will enhance the existing efficiency by the factor of 2. Can the ICT industry captains assembled here meet this challenge? Create BPO, Call Centres and ITES in rural sectors as a part of PURA enterprises using the electronic connectivity available in the form of high bandwidth broadband connectivity as a dark fibre which has reached till the block level in India. India is planning to establish 2.5 lakh village knowledge centres. ICT industry can establish rural call centres in the model of Kisan Call centre established by the Ministry of Agriculture which can provide domain knowledge in the services, agriculture and manufacturing sectors. This spread will increase the volume of users and automatically bring down the bandwidth cost and create a spiralling effect on efficiency and economy.

Energy is the lifeline of modern societies. But today, India has 17% of the world's population, and just 0.8% of the world's known oil and natural gas resources. We might expand the use of our coal reserves for some time and that too at a cost and with environmental challenges. The climate of the globe as a whole is changing. Our water resources are also diminishing at a faster rate. As it is said, energy and water demand will soon surely be a defining characteristic of our people's life in the 21st century.

Energy security rests on two principles. The first, to use the least amount of energy to provide services and cut down energy losses. The second, to secure access to all sources of energy including coal, oil and gas supplies worldwide, till the end of the fossil fuel era which is fast approaching. Simultaneously we should access technologies to provide a diverse supply of reliable, affordable and environmentally sustainable energy.

As you all know, our annual requirement of oil is 114 million tonnes. Significant part of this is consumed in the Transportation Sector. We produce only about 25 % of our total requirement. The presently known resources and future exploration of oil and gas may give mixed results. The import cost today of oil and natural gas is over Rs. 120,000 crores. Oil and gas prices are escalating; the barrel cost of oil has doubled within a year. This situation has to be combated.

Energy security, which means ensuring that our country can supply lifeline energy to all its citizens, at affordable costs at all times, is thus a very important and significant need and is an essential step forward. But it must be considered as a transition strategy, to enable us to achieve our real goal that is - Energy Independence or an economy which will function well with total freedom from oil, gas or coal imports. Is it possible?

Hence, Energy Independence has to be our nation's first and highest priority. We must be determined to achieve this within the next 25 years, i.e by the year 2030. This one major, 25-year national mission must be formulated, funds guaranteed, and the leadership entrusted without delay as public-private partnerships to our younger generation, now in their 30's, as their lifetime mission in a renewed drive for nation-building.

The corporate sector assembled here has to participate in a big way in alternative energy programmes, and banking sector should financially support these programmes in a big way. Now I would like to discuss on Bio-fuel and power generation missions.

Government has decided to permit mixing of 10% bio-fuel with diesel. This has opened up new opportunities for employment and wealth generation. We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland have been allotted for tree plantation. Certain multi-purpose trees such as *Jatropha* can grow well in wasteland with very little input. Once grown the crop has fifty years of life. Fruiting can take place in this plant in less than two years.

It yields oilseeds up to five tonnes per hectare per year and produces two tonnes of bio-diesel. Presently, the cost of bio-diesel through the plant is approximately Rs. 17 to Rs. 19 per litre which can be substantially reduced through choice of right size of the plant and using high yield variety plantation. Bio-diesel plants grown in 11 million hectares of land can yield a revenue of approximately Rs. 20,000 crore (nearly four billion dollars) a year and provide employment to over 12 million people both for plantation and running of the extraction plants. This is a sustainable development process leading to large scale employment of rural manpower. Also, it will reduce the foreign exchange outflow paid for importing crude oil, the cost of which is continuously rising in the international market. Moreover, use of bio-fuel is carbon neutral. This oil can also be used for soap and candle industries. De-oiled cake is a raw material for composting. Also *Jatropha* plantation provides a good environment for honey production. We should absorb best of the technologies available worldwide and start commercial operation soon. I would request the banking community assembled here to take the initiative, generate detailed project report in collaboration with technical agencies on this project and promote entrepreneurs with financial support from the banks in rural areas who can undertake the plantation and commissioning of extraction plant leading to production of cost-effective bio-fuel. Can there be a better project than this for coherent development of our rural sector?

Banking sector has a tremendous role in reinforcing the economy of the nation, by servicing the micro economic needs of all the three sectors of the economy – agriculture, manufacturing and services, at the centres of action in the country.

The financial services industry has been in the vanguard in the development phase in all the countries. The proactive approach adopted by many banks has led to phenomenal growth of the country. The days of development financial institutions seem to be over. The current fashion is the Universal Bank. The development finance responsibility with its inherent risks is squarely and fully on the banking sector. It is in this background I wish the bankers to play a positive role to assist the country to march towards development faster.

In India we have the experience of providing venture capital to a number of entrepreneurs. Of course a few of them succeeded also. In the present economic situation, it is essential the venture capital business for mission mode projects has to increase in magnitude, particularly with hassle-free procedures. This will accelerate the growth cycle and competitiveness of products in the world market.

Now let me discuss on how to carry out these missions with the human resource potential that India has and that is our core competence.

In the 21st century, India needs a large number of talented youth with higher education for the task of knowledge acquisition, knowledge imparting, knowledge creation and knowledge sharing. I am working for it. At present India has 540 million youth under the age of 25 which will continuously be growing till the year 2050. Keeping this resource in mind, the Universities and educational systems should create two cadres of personnel: (1) a global cadre of skilled youth with specific knowledge of special skills and (2) another global cadre of youth with higher education. These two cadres will be required not only for powering the manufacturing and services sector of India but also will be needed for fulfilling the human resource requirements of various countries. Thus, the universities will have to work towards increasing the throughput of the higher education system from the existing 6% to 20% by the year 2015, 30% by the year 2020 and 50% by the year 2040. The rest of the youth who are not covered by the higher education system should have skill sets in areas such as construction, carpentry, electrical systems, repair of mechanical systems, fashion design, para-legal, para-medical, accountancy, sales and marketing, software and hardware maintenance and service, software quality assurance personnel etc. This is the mission which must be undertaken by the corporate sector in partnership with educational institutions.

As you all come from industry, banking and other corporate institutions, I would like to talk to you about the linkage between the national economic development and creative leadership:

- Nation's Economic development is powered by competitiveness.

- The competitiveness is powered by knowledge power.
- The knowledge power is powered by technology and innovation.
- The technology and innovation is powered by resource investment.
- The resource investment is powered by revenue and return on investment.
- The revenue is powered by volume and repeat sales through customer loyalty.
- The customer loyalty is powered by quality and value of products.
- Quality and value of products is powered by employee productivity and innovation.
- The employee productivity is powered by employee loyalty, employee satisfaction and working environment.
- The working environment is powered by management stewardship and sound project management.
- Management stewardship is powered by creative leadership.

For success in all the missions which we have discussed so far, we need creative leaders. Creative leadership means exercising the vision to change the traditional role from the commander to the coach, manager to mentor, from director to delegator and from one who demands respect to one who facilitates self-respect. I am sure creative leadership spearheads all the institutions and the future aspiring institutions. For a prosperous and developed India, the important thrust will be on the growth in the number of creative leaders and innovative organisations that can create wealth through dedicated management system. In addition, the members of the PHD Chamber of Commerce and Industry can work out a plan for new type of venture capital to generate new enterprises.

I greet all the members of PHD Chamber of Commerce and Industry during the Centenary Celebrations and my best wishes to all of you for success in your mission of making India an empowered nation.

3

Health and Social Welfare

Service to Human being is Service to God

I AM INDEED delighted to participate in the inauguration of the Super Speciality and Research Block of Sir Ganga Ram Hospital in its Golden Jubilee Year. When I am with you I am reminded of two incidents connected with Sir Ganga Ram Hospital. The first incident dates back to 1998 when I was invited by Shri Dharma Viraji, a Padma Vibhushan awardee, and the architect of this hospital, to deliver the second Sir Ganga Ram Oration in that year. I salute late Dharma Viraji for his extra-ordinary contribution for evolving, establishing and bringing this hospital into a world class medicare centre: apart from his sterling contribution in the national affairs. The second incident arose due to a letter received by me in June 2004 stating that Shri Ramachandra Veerapa, a 96 years old Honourable Member of Lok Sabha, was ailing in Sir Ganga Ram Hospital and desired to meet me. He is a member of the 14th Lok Sabha and has been elected to the house continuously for 8 times. I visited and met Shri Ramachandra Veerapa at the hospital on 12 June 2004 and wished him fast recovery. I was impressed by the health care provided to the ailing MP by the specialist doctors and the nursing staff of this Hospital. I can see the vision of the pioneers of the Sir Ganga Ram Hospital resulting into health care with a humane heart. When you give quality health care with smile to those who cannot afford the cost you are indeed the blessed. I congratulate the Board of Trustees for establishing the Super Speciality and Research Block.

When I see the doctors I see them as pain removers. In a hospital when no doctors, no relatives are around the patients during night time, in the wards what you hear is pain and pain only. That is the time the nurses go around to provide consolation and relief to the patients. At that time nurses appear to be angels for the patients to

cater to their requirements like medicines, dressing and other daily needs. All of you provide yeoman service in removing human miseries and pain with human intelligence and patience. “Service to human being is service to God”. I greet the management, doctors, paramedical and support staff for their contribution in providing the state-of-the-art medicare to the needy patients. I was thinking what I should talk to this audience. I would like to share my views on the mission of India’s health care.

The Union Finance Minister during his Budget Speech on 8th July 2004 has extended the benefit of Section 80-1B to new hospitals with 100 beds or more set up in rural areas. Such hospitals will be entitled to a 100 per cent deduction of their profits for a period of five years. With the future vision for newer hospitals, institutions like Sir Ganga Ram Hospital can consider establishing hospitals in certain rural sectors, especially in the states like Bihar, Orissa and eastern UP. These rural hospitals can be established in such a way that quality health care can be assured for all in the country.

These rural hospitals can be linked through tele-medicine models to hospitals in urban areas. One of the institutions Narayana Hrudayalaya has connected 19 remote areas with Kolkata and Bangalore. They have treated 12,000 patients through telemedicine. The partners in this mission are private sector hospital and government hospitals. CARE Hospitals Hyderabad has a tele-medicine link between Hyderabad, Mehaboobnagar, Agartala and Delhi. Similarly, Indian Space Research Organisation (ISRO) has connected some leading hospitals to their health centres. These models can be replicated in different areas in the country to provide affordable, quality medicare to our rural masses who will have the benefit of attention from the renowned specialists of Sir Ganga Ram Hospital.

In addition to the above to make medicare affordable, a Medical Insurance Scheme which is in vogue in some parts of the country can be implemented by Sir Ganga Ram Hospital. In Karnataka, the state co-operative department in collaboration with Narayana Hrudayalaya has come out with a scheme called Yeshasvini. In this scheme, the villagers are required to pay a premium of Rs.5 per month. The

government contribution is Rs.2.50 per month. There are 17 lakh members in this scheme; the members are eligible to get free treatment from the best available medicare facility in the state in 85 recognized hospitals. Presently in this scheme they have provided free medical consultation to 27,000 people and carried out 7000 operations including 600 open-heart operations in 7 months. This model or an improved version can be considered by Sir Ganga Ram Hospital for many states for providing quality health care to the village community at an affordable cost.

In India we are having a variety of traditional systems of medicines such as Yoga and Naturopathy, Ayurveda, Unani, Homoeopathy and Siddha. These ancient systems of medicines are unique to our country and many times they are complementary to each other. This system needs scientific method of testing with clinical data. I would consider appropriate to create these wings in the hospital so that patients can have a choice in determining the system of medicine, which they would like to have. This will enable rapid development of medicines and fast track clearance of products through integrated clinical trials and approval from ethical committee. This area will be a great wealth generator for the nation.

I would like to recall an experience during my work as Scientific Adviser to Raksha Mantri. The lifestyle change pattern can be a great influencer in reducing the occurrence of cardiac problem among the Indian population. I recall there was a joint project of Defence Institute of Physiology and Allied Sciences (DIPAS), DRDO and the Global Hospital Research Centre governed by the Brahma Kumaris for studying the effect of “holistic lifestyle intervention” on the patients suffering from Coronary Artery Diseases after angioplasty and surgical intervention. The project involved both Control Group and the Experimental Group. The Control Group was subjected to conventional treatment whereas the Experimental Group was supported by an intervention involving low fat, high fibre vegetarian diet, walking and aerobic exercises and systematic meditation. This psychophysiological mind-body approach in treating heart patients of the Experimental Group resulted in dissolution of angiographic plaque and improvement in microcirculation of blood in heart components

of the patients. The treatment was also supported by participation of spouses and other family members of the patients, leading to a unique family system approach to medicare.

When I conducted the first review of the project, I found that nearly 60 people had reported positively about their well-being and their clinical reports showed remarkable improvement. When I visited the hospital again after two years, nearly 400 patients gave us a joyful presentation about their experiences. It was an experience of great happiness to see the patients presenting their X-ray records and angiogram, showing us how this unique way of treatment has given great relief to their hearts. The conflict between cardiology, psychology and theology still persists, but this experiment has given a new thrust and a lasting cure for heart patients. The message I would like to convey is that through the integration of medical science, physiology, health care, psychology and spirituality, a native Indian knowledge system in combination with allopathic systems can emerge. Sir Ganga Ram Hospital research team can study this model, improve them and apply them in their hospitals.

Recently I met Prof. Vijay K Varadan of Pennsylvania State University, US. He shared his experience on the possible line of treatment for Parkinson's disease and epilepsy. The primary symptoms in Parkinson disease as you all are aware are tremor or trembling in hands, arms, legs, jaw, and face, rigidity or stiffness of the limbs, slowness of movement and impaired balance. Prof Varadan has devised a wireless system for monitoring and control of Parkinson's disease. The system consists of an implantable DNA insert in the head region for generating a pulse to the nerve system; controlled either by a modified pacemaker or smart hat. A passive polymer based gyro sensor is implanted in the tremor location. The sensor gets the power from the pacemaker and the pacemaker then reads the tremor motion. The pacemaker then generates the pulse in the implanted device in the head to control the tremor. This appears to be a promising line of treatment for such diseases. Prof. Varadan also has reported that the few patients affected by Parkinson's diseases had a full recovery. I would recommend Ganga Ram Hospital team to work in such frontier areas of research.

Newer knowledge emerging out of research on stem cells from abroad and India has to be taken note of and studied — drawing of tens of thousands of stem cell — immature cells that are capable of transforming themselves into almost any kind of tissues — from the suffering patients and inject them into the heart to stimulate heart repair. In one case, it is reported that the pumping efficiency has increased from 25% to 40% over a period of four months. In 2003, successful stem cell procedures that resulted in measurable boost in blood pumping capacity have increased substantially in many countries across the globe. This holds a big promise for effective heart repair for ailing people.

During my visit to various laboratories in India, I happened to see the beginning of stem cell research for different purposes including brain research. I would like to share with you an important stem cell research application in the field of cardiology. When I met Dr. P. Venugopal, Director, All India Institute of Medical Sciences (AIIMS) a famous cardiovascular and thoracic surgeon, he told me about his experiences. He said in one of the cardiac diseases, where conventional medical and surgical treatments were ineffective because of the affliction of the heart muscle, use of autologous bone marrow stem cells implantation into the diseased heart muscles had been applied in order to improve the function of heart muscle. This kind of application of this procedure is the latest, and very few cases have been done in the world, the first time in India. This is expected to open new frontiers in the treatment of patients for regeneration of heart muscles, thereby giving new hope for the patients suffering from end stage heart disease. I suggest the Sir Gangaram Hospital may participate in such a great mission of research.

We need good hearts to treat the ailing patients, we need helping hands to remove the pain, and we need beautiful minds to give happiness to the patients. In this context, I would like to recall and share the essence of a poem. When God first created the human being, it took millions and millions of years to get the right human form. He went on experimenting and finally he realized the human configuration he wanted. Once realized, He gave life. First the man opened his eyes and said, “I thank you, Almighty.” Second thing he did, he smiled.

Almighty was very happy that his creation has done two right things. Then, God was preoccupied for some time, later when God looked at the man he found something is missing in him. He generated the fire in milli-seconds and created Shaitan (devil) out of the fire. He asked Shaitan to prostrate before the first human being as he is His image. The Shaitan refused to prostrate. He said, “Oh! Almighty you have created me out of fire, I am a superior creation”. The God was taken aback. He thought for a while and decided to integrate the man and Shaitan into one single system, that is, the human beings what we are. If we want to become close to Almighty God, let our mind and hand be kind to human beings who are suffering particularly with disease. That means we have defeated the Shaitan within us. The question is who will defeat whom? May God bless you to be close to God’s image. Your kindness will flow through your actions, thousands and thousands of patients will be relieved of the pain and they will say “Thank you doctor” with the smile. That means you are in God’s image.

I am happy to inaugurate the Super Speciality and Research Block of Sir Ganga Ram Hospital. My best wishes to all members of Sir Ganga Ram Hospital community for success in their missions.

Elimination of Polio – A Global Mission

I AM DELIGHTED to participate in the International Polio Plus Summit organized by the Rotary International. I greet the organizers, members of the Central and State Governments, members of the participating countries, World Health Organization, UNICEF, Centre for Disease Control (Atlanta), scientists, doctors and other distinguished guests.

Rotary International has been in the task of eradicating polio since the year 1985. In India the programme commenced in 1985. The worldwide polio incident has declined from 3,50,000 a year to 1918 cases in 2002 and 225 cases in 2003. The cases so far reported in the year 2004 are 30. The majority of the cases reported belong to Uttar Pradesh and Bihar. The occurrence of polio is high in certain districts of Uttar Pradesh, viz. Badaun, Moradabad, Muzaffarnagar, and Saharanpur. The state and central health ministries have to mount a mission mode programme to make UP and Bihar polio-free.

There is a need to establish the causes of such occurrence and find remedial measures so that we can eradicate the occurrence of polio from these districts. We can adopt the following strategy for motivating the families to bring the children for vaccination. There must be a system to watch the health care requirement of every new born child in the families in the villages and towns of these districts. Once the record of the children is available the health authorities must go to the parents and educate them on the necessity for immunizing the child against polio. They must also be told that there is no side effect for the child due to polio vaccination. Also, it may be advisable to have polio camps in these villages on a monthly basis using a mobile clinic so that all the children in the age group of zero to three are

immunized during these camps. The children who are not brought for immunization should also be tracked and it may be necessary to send the doctor or nursing assistants to their homes for providing the immunization. If this special attention is given, I am sure we can certainly make Uttar Pradesh and Bihar totally free from polio.

It is reported that there are some stray incidents where the child is affected by the polio even after vaccination. This can happen in those regions where the dosage is not able to cope with the viral load in the region. In such cases it will be necessary to increase the dose and also adopt clinical methods to find whether the immunization has taken place or not after the administration of polio vaccine. I am sure the medical community will be able to find an effective solution to this problem. I am happy to note that from thousands and hundreds of cases of polio occurrence in the past years we have come to a double digit number this year. This I would consider definitely as a commendable achievement. However, we cannot slacken our efforts till we see that there is zero occurrence of polio in the country from all the districts. The Rotary International and the participating organisations are definitely carrying out a very noble mission of removing the pain of the people. I can certainly imagine the pain of the parents whose children are affected by polio.

An important event I would like to share with you is about the fitment of FRO (Floor Reaction Orthosis) to a polio affected child. During my visit to one of the hospitals in Hyderabad, I found many children were struggling to walk with an artificial limb weighing over 3 kgs. At the request of Prof. Prasad of NIMS, Head of orthopaedic department at that time, I asked my AGNI friends why we cannot use the composite material used for AGNI heat shield for fabricating FROs for polio affected patients. They immediately said it is possible. We worked on this project for some time and came up with an FRO for the child weighing around 300 gms. exactly 1/10th of the weight which the child was carrying. The doctors helped us to fit the new lightweight FRO on the child and the child started walking and running around. Her parents were also present. Tears rolled down from the eyes of the parents seeing their daughter running with light caliper.

With the lightweight device provided by the hospital she could run, ride a bicycle and do all sorts of things which she had been denied for a long time. The removal of the pain and the freedom attained by the child gave me a state of bliss which I never experienced during any of the major successes in my career. This bliss came when a polio affected child started walking and running. I will experience greater bliss if the child in the first place is not affected by the polio at all. I am sure all of you assembled here are in this mission. With your persistent efforts we should see that no polio case occurs during the year 2005 and beyond. I would appeal to all the parents to take pro-active steps to get their children immunized. It should be the responsibility of all the social organizations working in our districts to send this message to all the people living in the region. Also, they must work with medical organizations to make the doctors reach the remote areas and immunize the child well before the danger strikes.

The central and state governments have to take up another mission to get the statistics of total number of affected polio children and grown-ups. There are two groups of affected people. I have observed that in one case we can fit the FRO's to the polio affected patients directly and they become useful to the society. Such people constitute 70% of the cases. The remaining 30% cases need surgical intervention before fitment of the gadgets like calipers to the patients. This mission has to be taken up jointly by the state and central governments.

I see the commitment from various organizations for the elimination of polio in different regions. I would like to share another area of concern with this audience. Various parts of the world are getting affected by HIV/AIDS. It is time that the national and international agencies joined together to mount a concerted programme in eliminating this dreaded disease from the planet earth. It can be a global mission with international agencies, WHO, Rotary international and member countries as partners. Definitely, India will be a partner in this mission. I am very happy to see the pioneering mission of the Rotary international, which commenced in 1985, culminating in a polio free world by 2005. India definitely is heading towards that.

India and Pakistan assembling here in the same dais today to fight polio-virus is a beautiful thing to happen. We have our enemies, common enemies, that is poverty and disease. Let us fight against these enemies instead of fighting amongst ourselves.

My best wishes to all of you for success in your mission of eradicating the pain of humanity.

Mission towards Healthy Hearts

I AM DELIGHTED to participate in the inauguration of the International Centre for Biomedical Sciences and Technology (Research, Training and Application). My greetings to the surgeons, doctors, medical scientists and technologists, pharmacologists, distinguished guests and all the participants. Cardiac care is a vital health care area for the Indian community. I am happy to note that this centre in collaboration with Manipal Academy of Higher Education, Bangalore, Sri Venkateswara Institute of Medical Sciences, Tirupati, Meenakshi Academy of Higher Education and Research, Chennai, Birla Institute of Technology and Sciences, Pilani and Indian Institute of Technology, Madras is planning graduate programmes in Bio-technology, Bio-Informatics, Bio-Medical Engineering, Genetic Engineering and Genetics. This Centre has a unique system of patient information system, which can be accessed by the relatives and friends of the patients admitted in this hospital for getting online information about the patients' condition. In this gathering I would like to discuss on the "Mission towards Healthy Hearts".

Recently, three Indians along with other nationals were abducted in Iraq, and India was making all-out efforts to convince the abductors for getting them released. Around that time Dr K.M. Cherian wrote to me that, as an example of the sympathy and consideration which a common man in India has for the Iraqis the example of twenty complicated open heart surgeries conducted on Iraqi children as early as February-March 2004 by the International Centre for Cardiothoracic and Vascular Diseases. He has done it merely out of human compassion. Much later, this information was provided to the concerned Ministry for using in the negotiation process with

the abductors. This example shows that the noble medical profession does not see geographical barriers and every heart is the same for this community.

This Centre has established the first Cardiology and Cardiovascular Centre in the rural set-up in the village of Parumala in Kerala which has a population of 8300. I am happy to note that the Centre had already carried out 300 angiograms, 25 angioplasties with stenting and nearly 100 open heart surgeries including on children. This is a good rural development model where high quality health care has reached the remote villages and I am sure this facility can be extended as a medical tourism project to other villages in the country. This type of data and work done to the society should be utilized for realizing quality health care for the rural sector. At this stage let me narrate an example which touched my heart.

In October 2002, I inaugurated the CARE Hospitals telemedicine units at the G.B. Pant Hospital, Tripura, and I interacted with patients at different centres where I came across a 13 year old boy from Kailashar, Tripura. His parents are farm labourers and even a tiny piece of land they own was sold to provide medical treatment to this boy before CARE hospital diagnosed the problem of this boy. This boy was suffering from chronic rheumatic heart disease with severe mitral stenosis. His heart ailment was noticed three years ago, when he complained of breathlessness and chest pain. He was also coughing blood and lost weight, according to his elder brother Ismail Ali. Doctors at Agartala found that his condition was serious and needed specialized treatment which was expensive. He discontinued his studies as he couldn't take the strain of walking down to the school or even play around with the other kids. He was taken to the CARE Hospital at Hyderabad, and was treated by Dr. B. Somaraju and Dr. Raghava Raju who carried out the balloon dilatation. The entire treatment and travel expenses were borne by the hospital. The boy's condition is being continuously monitored and he is doing fine. He has also started going to school. CARE foundation has recently started a "Little Hearts Foundation" through voluntary contributions made by philanthropists. They have so far carried out 58 heart operations on children.

Now I would like to discuss some of the leading research areas.

Animal experiments have shown that stem cell can be coaxed to become nerve cell and nerve cell to become a muscle cell. It has also been learnt that the stem cell seems to go preferentially to injured tissues when introduced in an animal. These findings are useful for treating diseases where cells are damaged or malfunctioning and require replacement. Parkinson's disease, juvenile diabetes, stroke, spinal cord injuries, and mental retardation in children may find cure through this treatment. Prof. Venugopal has done treatment of diseased hardened muscles of heart.

I would like to share with you the research work done by Prof Vijay K. Varadan of Pennsylvania State University, U.S. He shared with me the possible line of treatment for Parkinson's disease and epilepsy. The primary symptoms in Parkinson's disease as you all are aware are tremor or trembling in hands, arms, legs, jaw, and face, rigidity or stiffness of the limbs, slowness of movement and impaired balance. Prof Varadan has devised a wireless system for monitoring and control of Parkinson's disease. The system consists of an implantable DNA insert in the head region for generating a pulse to the nerve system controlled either by a modified pacemaker or smart hat. Passive polymer-based gyro sensors are implanted in the tremor location. The sensor gets the power from the pacemaker and the pacemaker then reads the tremor motion. The pacemaker then generates the pulse in the implanted device in the head to control the tremor. This appears to be a promising line of treatment for such diseases. Prof. Varadan also has reported that the few patients affected by Parkinson's disease had a full recovery. I would suggest that this International Centre can work with Prof. Varadan's group for evolving solutions for Parkinson's disease through collaborative research.

Open heart surgery to replace the diseased heart valves with prosthesis has become a common modality for treatment. Recent research has brought out bio-prosthetic heart valve implants and this has been found successful in clinical trials. This is the promising area of research in view of the cost consideration and also due to anti-coagulation properties. Another area of research is development of

cardiac homograft. Also, there is a need to standardize the homograft and genograft through decellularisation procedure which may eventually lead to the development of autografts. I am happy that the Centre will be progressing research in all these front line areas of research. I would suggest that this Centre can work in collaboration with All India Institute of Medical Sciences, Delhi, Sri Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram and other leading medical institutions in the country.

The convergence of bioscience and IT into Bioinformatics has given the thrust to researchers for genomics-based drug discovery and development. Pressure is mounting on the pharmaceutical companies to reduce or at least control costs, and have a growing need for new informatics tools to help manage the influx of data from genomics, and turn that data into tomorrow's drugs. Indian IT industry has a tremendous opportunity in the drug development.

In computational biology the most expensive investment is in the software for drug analysis, modelling and design. These investments at times are of the order of several hundreds of thousands of dollars and thus the computational biology had gone beyond the reach of many colleges and universities and also small scale start-ups. However many academic institutions including the Indian Institute of Science and CSIR laboratories have already built up the capability to develop the software, but nevertheless lacked the infrastructure to convert this software into a product. The New Millennium Indian Technology Leadership Initiative (NMITLI), CSIR had pioneered the efforts to develop a world class software package called Bio-Suite using TCS, one of our software industry and academic institutions. Bio-Suite is a state-of-the-art software package that caters to all aspects of computational biology from genomics to structure-based drug design. It incorporates the latest publicly known algorithms, as chosen by our panel of academic partners, and has been coded entirely by the Indian software team, using the best software engineering practices. It can be used by academic and R&D institutions, small/medium biotechnology companies at an affordable cost but with the functionality of well-known world class software. I would suggest the International Centre for Biomedical Sciences and Technology (Research, Training

and Application) make use of this and contribute for the further development in this direction.

I note that most medical equipment have considerable component of computers and peripherals whose cost has been plummeting in the open market. But, the cost of medical equipment and the services has not been coming down at the same pace as we see in ICT. India is well poised with its excellent ICT and health care base to work towards a world cause to make modern services such as MRI, CT Scan and others, affordable by the poor. The specifications and acceptance standards for these equipment and services can be laid down by an expert committee. They can also ensure that the regulations and clinical validation procedures do not become a hindrance but instead help in getting these products developed and marketed in a time-bound manner. This will open up the entire world market to Indian products.

The International Centre for Biomedical Sciences and Technology's training wing will be generating a cadre of physician assistants who will be a vital professional link between the doctors and paramedics. These personnel will be extremely useful for promoting health care delivery system in the rural areas. This Centre should create a growth plan for this cadre by enlarging their scope of work in research areas with their innate clinical experience so that they can eventually aspire to become scientists. This will need discussion in a common forum of institutions where similar training facilities are being offered. With this model, it is essential to build education and employment generation in the rural sector.

We need good hearts to treat the ailing hearts, we need helping hands to remove the pain, and we need beautiful minds to give happiness to the patients. In this context, I would like to recall a poem. I would like to share with you the essence of it.

When God first created the human being, it took millions and millions of years to get the right shape. He went on experimenting and finally he realized the shape he wanted. Once realized, he gave life. First the man said, "I thank you, Almighty." Second thing he did, he smiled at God. Almighty was very happy, that his creation has done two good things. Then, God was preoccupied for some time,

later when God looked at the man he found something is missing in him. He created the fire in milli-seconds and created Shaitan out of fire. He asked Shaitan to prostrate before the first human being that he created in his image. The Shaitan refused to prostrate. He said, “Oh! Almighty you have created me out of fire, I am a superior creation”. The God was taken aback. He thought for a while and decided to integrate the man and Shaitan into one single system, that is the human race what we are. If we want to become close to Almighty God, let our mind and hand be kind to human beings who are suffering with pain. That means we have defeated the Shaitan within us. The question is who will defeat whom? May God bless you to be close to God’s image and the Shaitan gets defeated. Your kindness will flow through your actions, thousands and thousands of patients will be relieved of the heart pain and they will say “Thank you doctor” with the smile. That means you are in God’s image.

Nano–Science for Treatment of Cancer and Brain Related Diseases

I AM INDEED delighted to participate in the presentation of Ranbaxy Research Awards for the years 2002 and 2003. My greetings to the organizers, members of the Ranbaxy Science Foundation, scientists, researchers, chemists, educationists, industrialists and distinguished guests. My congratulations to all the award winners for their important contributions in the area of medical research. It is observed that Ranbaxy Research Foundation is one of the busiest research foundations and has been regularly conducting scientific meets and conferences in front line areas of research and current problems of public health. These conferences would have provided research direction for the scientists and enabled the pharmaceutical industries to provide cost-effective drugs to the needy. The research thrust and original drug formulations are very important in view of WTO norms coming into effect by the year 2005. I visualize our medical research teams in India will take up the challenge of developing molecules to drug leading to value added production and marketing.

Indian population is highly susceptible to coronary heart diseases, that too at a relatively young age irrespective of where they live. As you are aware, Gene Chip arrays have tremendous potential to reach goals from identifying genetic variations associated with heart disease for discovering new drug targets.

Recently, I was in Chennai at Dr. Cherian's Medical Centre. It is known as International Centre for Biomedical Sciences and Technology (Research & Applications). There I interacted with Dr.

Emmanuel, who is working in the area of Gene Chip. He says the Gene Chip can be used for finding the existence of genetic diseases including coronary artery diseases in the baby during a certain stage of pregnancy itself.

As many as 50 different mutated genes are identified as responsible for heart problems in Indian population. If a person is not having any of these harmful mutated genes, then he may not suffer from heart ailments. The Gene Chip is one which, on contacting with the blood, immediately identifies the mutated genes in the person. Based on this information, proper guidance can be given to the patients and parents. The chip could also be modified to adjust to the patient's system to develop those chemicals which in turn will help the patient recover from the present situation.

It is reported that gene differences between humans and most animals are very nominal. More than 90% of our DNA is similar. This property is a boon to researchers since animal models can be subsequently used for curing human diseases based on trial data. It has also been found that Gene Chips can be used for early diagnosis of tumors and their treatment. Integrating molecular biology, cytogenetics and biochemistry, bio-chip technology is regarded as one of the greatest inventions in the research of gene functions. It is far superior to molecular biological technology in terms of speed and accuracy. I would recommend to the medical researchers to progress further in this area for finding the application of Gene Chip as a diagnostic tool and as a treatment regime for many diseases.

When I visited Chattisgarh recently, I was informed by the various authorities that sickle cell anaemia disease is widely prevalent in tribal areas there and even in the adjoining States. I understand over 25 lakh population suffers from this disease. Life expectancy of this population is quite low and it is reported that this disease is a silent killer.

Sickle cell disease is an inherited condition. Two genes for the sickle haemoglobin must be inherited from one's parents in order to

have the disease. A person who receives a gene for sickle cell disease from one parent and a normal gene from the other has a condition called sickle cell trait. Sickle cell trait produces no symptoms or problems for most people. Sickle cell disease can neither be contracted nor passed on to another person. The severity of sickle cell disease varies tremendously. Some people with sickle cell disease lead lives that are nearly normal. Others are less fortunate, and can suffer from a variety of complications. The available treatment strategies can be divided into anti-sickling agents, vasoactive drugs, bone marrow transplantation and gene therapy. Recently I came across in the internet, Dr. Eric Kmiec, an Associate Professor of Microbiology and Immunology at Thomas Jefferson University had shown that the new gene repair technology may hold promise as a treatment for sickle cell anaemia and other diseases by correcting the DNA mutation from which they arise. I would recommend to the medical scientists to apply their mind collectively to find a preventive and post-occurrence cost-effective treatment for this dreaded disease. I would even suggest to Ranbaxy Medical Research group to get in touch with Thomas Jefferson University for finding a fast, cost-effective diagnostic method and treatment for this disease.

When I was a Professor at Anna University in Chennai before taking up this present assignment, apart from my teaching activities on various societal transformation missions, I was guiding a doctoral research project. My student's name is Rev. Father George A. The research was aimed to find integrated solution using a software, hardware application to achieve a near normal functioning of the brain of mentally challenged children. When I saw some of the mentally challenged children performing certain activities like singing, painting in Central Institute of Mental Retardation, Thiruvananthapuram, I got convinced that one day convergence of information and communication technology, medical electronics, biotechnology and mathematical simulation can find a solution for their problem. We have been studying the mentally challenged children in various research institutions, homes for mentally retarded and hospitals. We are confident that it will be

possible to transform the functions of the damaged portion of the brain, say left hemisphere, to the normal portion, right hemisphere of the brain by some triggering mechanism, or by implanting a bio-chip to carry out those functions. This is a complex problem which needs an integrated approach involving medical scientists and technologists for a targeted permanent solution which can help children afflicted with this mental disability.

A newer input has come to us recently through which the genes responsible for determining the chemical ingredients which create the mentally challenged state in the children could be identified. Then the Gene Chip can identify the responsible genes present in the parents and the children. Taking a blood sample, the chip should also suggest that the production of such and such chemical should be beneficial to the patient. The chip could suggest, which signals if sent would induce the brain to synthesize the required chemicals. Such signals should then be sent, by the external fittings like a cell phone apparatus, to the brain. The required signals can be tested out on a culture of neuron. The signals sent by the chip, or advised by the chip, should help the brain to make those chemical ingredients to make these goals achieved. When we started our research, it looked as if for solving the problem we were nowhere. But today, we have many methods of solutions coming from many researchers. Now we have to synthesize a solution leading to non-invasive treatment regime.

The recent identification and characterization of progenitors with stem cell properties has opened up new avenues that may be useful for treating functional impairments caused by the death of specific cell population. The stem cell may help restore functioning of certain defective organs, by repopulating or rescuing the damaged cells from further degeneration. There will be a revolution in the medical treatment for heart care, cancer, visually impaired and mentally challenged. It is essential to launch an integrated national stem cell research programme.

During my visit to various laboratories, I happened to see the beginning of stem cell research for different purposes including brain

research. I would like to share with you two very important stem cell research applications in the field of cardiology and visual impairment. When I met Dr. P. Venugopal, a famous cardiac surgeon, he told me about his experiences. He said in one of the cardiac diseases, where conventional, medical and surgical treatments were ineffective because of the affliction of the heart muscle, use of autologous bone marrow stem cells implantation into the diseased heart muscles had been applied in order to improve the function of the heart muscle. This kind of application of this procedure is the latest and very few cases have been done in the world, the first time in India. This is expected to open new frontiers in the treatment of patients for regeneration of heart muscles, thereby giving new hope for the patients suffering from end stage heart disease. The stem cells are being tried in other diseases like diabetes in order to offer cure for the patients suffering from long term and intractable diabetes. This is being applied by injecting the stem cells into the patient's artery supplying the pancreas. The results are still awaited. *The New Scientist* (dated 25th September) has reported another remarkable recovery of a heart patient at the John Wolfgang Goethe University at Frankfurt. Of course for the first time, I have come across a warning, stating that risk is very high. Against stem cell solution for every aspect of human disease, it is reported that large amount of tests on animals is needed before applying it on humans.

The Stem Cell technology is at the cutting edge, practised by no more than three or four centres across the globe. It involves the harvesting of stem cells from the limbus of the eye and explant - culturing them such that the resultant material can be used to reconstruct the damaged outer surface of the eye, thus enabling it to better accept a corneal graft. The L.V. Prasad Eye Institute has succeeded in translating this technology from the Petri dish to the patient's eye. Such advanced technologies need to be effectively deployed to provide critical eye care to the majority of the population. When I recently visited LV Prasad Eye Institute, Prof. Taraprasad Das showed me the results of vision recovery of about 150 patients affected by fire accidents. Here I would like to suggest to medical researchers in India to take up a mission mode stem cell research taking into account all aspects.

As we have discussed Gene Chip and Stem Cell research for many diseases relevant to India, we have to recognize that another potential area of research of nano-science has already entered into diagnosis and treatment, particularly diseases relating to brain and cancer. It is predicted that nano-robots will carry diagnostic probe and treatment solutions. Finally the robots will get digested in the human system. Sometimes I feel the world may declare the early phase of twenty-first century, as a century of nano-science research and technology leading to revolution in human life enrichment.

Technology brings Smiles to Special Children

I AM INDEED delighted to participate in the dedication ceremony of Polytechnic of Spastics Society of Karnataka. I greet the organizers, members of the spastic society, doctors, paramedical staff, medical technologists, NGOs and other distinguished invitees.

It is estimated that in India the disabled persons constitute 5% of the total population. I would request the Ministry of Social Justice and Empowerment to work out the statistics within a year. The holistic rehabilitation of these persons involves a multi-sectoral approach and creation of a condition in which they can fully realize their potential and live their lives independently and work and contribute. Presently it is estimated that less than 20% of the disabled population alone are brought under the purview of rehabilitation schemes. Majority of the disabled who are not receiving any rehabilitation aid or advice belong to the rural sector and they remain only under parental care and suffer the pain all through their lives. It is necessary to have counselling for the parents and relatives of the disabled and motivate them to come forward to seek the help of specialist agencies who can assist them in getting the right supportive devices and general/vocational training for their wards. In addition to providing vocational training, it is essential for government and non-governmental agencies to give psychological training for 3 to 6 months to create a spirit of “We can do it, we will win” among the disabled persons. Combination of vocational training and the higher efforts of the disabled persons will generate the indomitable spirit. I would like to share with you some of my thoughts on this crucial human welfare mission of “Indomitable spirit”.

I consider that the perception of disability lies in the mind. Surely a person with a pure and enlightened mind is a valuable citizen irrespective of whether he is physically disabled or not. The life of a disabled person can be enriched through creation of indomitable spirit in him/her. I would like to share one example of an individual who has excelled in his field with all the disabilities.

During my visit to Bulgaria in 2003, I visited National Art Gallery of Bulgaria. There I saw an exhibition of paintings, mostly done by Bulgarian painters which inspired and impressed me. I also saw 100th birth anniversary exposition of the famous Bulgarian artist Zlatju Bojadjev. Hundreds of paintings were done by him using the right hand as is normally done. I was told that his right hand subsequently was paralyzed. But the indomitable spirit in him, made him paint using his left hand and these more beautiful paintings were also displayed. That struck me, that constructive people cannot be hampered by a physical defect, as the power comes from inside to make one to go ahead with the mission of his life.

I would like to suggest a few societal and technological support missions needed for making disabled persons to live near normal life.

One of the important concerns is to provide easy accessibility to public buildings, schools, colleges, banks, transport etc. I understand Delhi Metro Rail Corporation has made proper provisions for the benefit of those who are physically challenged. We should make all efforts to provide conducive working environment with easy accessibility. A tripartite approach to handle, educate and empower the disabled has to be in place with the assistance of parents, teachers and social service/health care agencies. Technological and industrial partners in this effort should aim at providing affordable devices and dependable services.

We have to make efforts to ensure that disabled persons get equal opportunities and they do not remain isolated in the society. We have to provide “equalization of opportunity” for persons with disabilities by providing seemingly simple, basic, and obvious services as access ramps and sidewalk indentations for the convenience of the disabled people. We need to realize the fact that this society is for all,

encompassing human diversity and leading to development of the human potential in each person.

Assistive devices can often minimize handicaps. While we have developed many new and useful items, we need to pay attention to quality as well as affordable cost. Research and development in this field is vital. We must harness Information Technology to improve access to the printed word for persons with visual impairment. While text in English can be scanned, transferred to the computer and heard through voice software, this facility is not yet available for the Indian languages at the speed and sophistication of English language. While material in English can easily be transcribed into Braille, this facility is not available for many of the Indian languages. Consequently, availability of text books and other reading materials in the Indian languages in Braille is scarce and production is expensive and time consuming. I suggest to the IT community to device a Braille keyboard with the necessary software to convert the Braille input into text and speech in the Indian languages.

When I was in Kolkata interacting with 9000 children at the Netaji Indoor Stadium, one boy suffering from visual impairment asked me, “Sir, what kind of education facilities are provided in the Knowledge Society, for visually handicapped children like me?” There are many like him. Let me share one thought with you. I had met many physically and mentally challenged children, visiting Rashtrapati Bhavan and also during my visits to various States and different countries. My belief all along was reconfirmed that these children like all others have an equal urge to pursue their studies and work. We have to provide solutions to their problems with the aid of Information Technology, by developing audio books, talking websites, voice assistive interfaces and other devices. We should launch programmes with IT institutions for developing aids for the visually handicapped at an affordable cost.

A seven year old boy wrote to me from Belgaum that he lost both his legs in an accident and sought my help. The boy was attended to by my friends who are specialist doctors and engineers. They took it as a mission to make the boy walk. They brought the technology of

light weight FROs and made the mission a success. The whole of Belgaum was ecstatic and approached my friends to help many more such needy children. DRDO and NIMS with the help of the local Lion's Club facilitated fitment of light weight FROs to 315 polio affected children. This incident made me to visit Belgaum. I witnessed the beautiful scene of how human hearts of technologists and scientists have been touched by challenges of the young children.

I visualize a scene in which some of the disabled have to become part of the Internet culture. Lack of access to the right information at the right time is a bothering concern for the disabled. Information and Communication Technology (ICT) will provide solution to make Internet friendly towards differently challenged individuals enabling them to benefit from the awesome power of the Internet. Physical mobility of the disabled may be minimized or eliminated by the virtual office concepts in which people are allowed to work from their homes through computers and deliver their work output to their offices online. Even while we work towards such near-futuristic possibilities, we should also try to provide existing services for the disabled. For example, why not provide mobile telephones at a lower cost to those who are disabled as they need it the most for regular work and his/her safety?

When I was a Professor at Anna University in Chennai before taking up this present assignment, apart from my teaching activities on various societal transformation missions, I was guiding a doctoral research project. My student's name is Rev. Father A.K. George. The research was aimed to find integrated solution using a software-hardware application to achieve a near normal functioning of the brain of mentally challenged children. When I saw some of the mentally challenged children performing certain activities like singing, painting in Central Institute of Mental Retardation, Thiruvananthapuram, I got convinced that one day convergence of information and communication technology, medical electronics, bio-technology and mathematical simulation can find a solution for their problem. We have been studying the mentally challenged children in various research institutions, homes for mentally retarded and hospitals. We are confident that it will be possible to transform the functions of the damaged portion of the brain, say left hemisphere, to the normal portion, right hemisphere,

of the brain by some triggering mechanism, or by implanting a bio-chip to carry out those functions. This is a complex problem which needs an integrated approach involving medical scientists and technologists for a targeted permanent solution which can help children afflicted with this mental disability. A newer input has come to us recently through which the genes responsible for determining the chemical ingredient which create the mentally challenged state in the children could be identified. Then the Gene Chip can identify the responsible genes present in the parents and the children. Taking a blood sample, the chip should also suggest that the production of such and such chemical should be beneficial to the patient. The chip could suggest which signals, if sent, would induce the brain to synthesize the required chemicals. Such signals should then be sent by the external fittings, like a cell phone apparatus, to the brain. The required signals can be tested out on a culture of neuron. The signals sent by the chip or advised by the chip, should help the brain to make those chemical ingredients to make these goals achieved. When we started our research, it looked as if for solving the problem we were nowhere. But today, we have many methods of solutions coming from many researchers. Now we have to synthesize a solution leading to non-invasive treatment regime.

In every sphere of life, women with disabilities are very high. The unemployment rate for disabled women is phenomenally high. Government and social organisations, educational institutions and industry have to work together and evolve methods for removing the high unemployment of women having disability and bring them into the mainstream of life by building capacity in them to make useful contribution to nation building tasks.

Rehabilitation process should aim at enabling persons with disabilities to reach and maintain their optimal physical, sensory, intellectual, psychological and/or social functional levels, thus providing them with the tools to change their lives towards a higher level of independence. Rehabilitation process has to include measures to provide and/or restore functions, or compensate for the loss or absence of a function or for a functional limitation. It should include a wide range of measures and activities from more basic and general rehabilitation

to goal-oriented activities, for instance vocational rehabilitation. The most important need is to enlist people as support group personnel who have love and passion for serving others. Polytechnic for Inclusive Education created by the Spastic Society of Karnataka will meet the rehabilitation needs of the differently abled children. I understand it will cater to the needs of members of the community who have neurological impairment, hearing impairment, different abled persons with communication disorders, persons with multiple disabilities and physical disabilities. In addition their classmates would be students who have passed out from regular educational establishments and who do not have obvious disabilities. This type of inclusive atmosphere will enable the differently abled children nearly normal. At this point I would like to share my experience during my visit to Tanzania in September. There I visited a school named Uhuru Mchanganyiko Primary School which had inclusive training for the disabled children of different age groups and different disabilities. I was told that the children were really happy in this integrated environment and their learning ability got enhanced substantially.

I would like to explain an incident which took place in Rashtrapati Bhavan. On 27th November 2003. I met about 1000 differently challenged children, who were taking part in the Abilympics. They were extremely enthusiastic to visit Rashtrapati Bhavan and the environment gave them happiness. To that gathering, I recited a small poem, which runs like this:

We are all God's children,
Our minds are stronger than diamond.
We will win, win, win with our mighty will.
God is with us; who can be against!

On hearing this, a boy from Iran by name Mustafa came to me; he didn't have both legs and was fitted with artificial limbs. He thrust a paper in my hand. He had written a beautiful poem titled "Courage", in Persian language. It reads like this:

"I don't have legs. My mind says: Don't weep, don't weep. For, I need not bow even in front of a King." I was really moved by the positive thinking of that boy. It shows his courage to face the life

with optimism. I am sure the Polytechnic for inclusive education will provide the necessary vocational training and the emotional support to the children for living a near normal life in our society. I would now dedicate the Polytechnic for Inclusive Education established by the Spastic Society of Karnataka to the nation.

We require an innovative and caring mind to provide productive employment to the disabled persons. To achieve this, a committee of experts including representatives from corporate and voluntary sectors has identified around 120 occupations at executive/management/supervisory levels and around 946 occupations at skilled/semi-skilled/unskilled levels for employing disabled persons without compromising on the quality of work. Organisations and industry should voluntarily come forward to offer some of the occupations to the disabled so that they can realize their economic independence and also have the satisfaction of contributing to the cause of removing pain. Now the call centres are becoming important business centres in the country. With the minimum hardware changes through a short training programme the call centres can employ a large number of visually handicapped persons for efficient work in their establishments. I would recommend to call centre institutions all over the country to facilitate conduct of such courses for the disabled persons in mission mode and provide employment.

I wish you success and happiness in all your missions of providing service to the humanity. May God bless you.

Eye Care – A Noble Mission

I AM DELIGHTED to participate in the inauguration of ORBIS DC-10 Flying Eye Hospital programme organized by ORBIS International India country programme. I greet the organizers, ophthalmologists, foreign delegates, distinguished medical practitioners and distinguished guests on this occasion.

I appreciate the airborne pioneering service rendered by ORBIS DC-10 Flying Eye Hospital during the last two decades. I understand ORBIS came to India for the first time in 1988 and worked in Hyderabad and New Delhi. The Flying Eye Hospital(FEH) provided an enabling environment for training and actual treatment for some of the eye care professionals from India. Since then there has been a number of visits by ORBIS and today it has a dedicated mission for mitigating avoidable childhood blindness and corneal blindness in the country. I would like to discuss the topic “Eye Care is a Noble Mission”.

Over the last two decades, India has made significant advances in eye care and it is recognized as one of the leaders in eye care. India has sixteen “Child Sight Centres” spread in different parts of the country of which twelve are developed by ORBIS. The country recognizes this important contribution by ORBIS and its dedicated team of doctors.

I had a discussion with Dr. Gullapalli Nageswara Rao, President of International Agency for the Prevention of Blindness – Vision 2020, whose mission is to remove blindness from the world.

There are nearly 50 million blind people in the world today and 150 million with low vision. Out of this 200 million, 12 million are in India and the number in rural areas accounts for 8.4 million. How to address this problem?

The pyramid model as focused by Dr.G.N. Rao involves creation of a four-tier system of treatment namely primary, secondary, tertiary and advanced tertiary care. In India, we have 20% vision centres for primary care, 70% service centres for secondary care, 50% training centres for tertiary care and 25% centres of excellence. We need to double the investment to provide full complement of eye care facility for all the four sectors with participating eye centres, government agencies and international partners like ORBIS.

As you are all aware, blindness is predominantly an age-related problem, with the prevalence rising from childhood to old age. It is estimated that 5 out of every 100 persons over 60 years of age are blind and that 7 out of 1000 people in the world are blind. It has been roughly estimated that the direct cost of blindness to our society is of the order of \$ 25 billion per year whereas only \$92 million are needed every year to control the three major causes of blindness. Therefore, we can see that the prevention of blindness is one of the most cost-effective public health interventions which are available in the field of health care. To this end, the efforts of initiatives like those being made by ORBIS Flying Eye Hospital will help the community at large to gain from the rapid advances being made in the field of eye care and to reduce the costs to our society from this affliction. Normally, low vision people tend to lose sight if it is not taken care of at the right time. All the national eye care centres and ORBIS have to focus more on treating in large scale low vision people in time with participating countries.

In India, we have a National Programme for the Control of Blindness which was started in the year 1976. The programme aims to reduce the prevalence of blindness from 1.4 % to 0.3 %. The main objectives of this programme are to develop eye-care infrastructure throughout the country and to build institutional capacity for eye care with expansion into underserved areas. An important component of this national programme is also to develop the human resource capacity for eye care at all levels. It is in this context that the training programme of ORBIS will facilitate quality service delivery by empowering, equipping and building human resource capacity of different organisations connected with the field of eye care in India.

ORBIS India Programme focuses on capacity building and advocacy. Capacity building includes training and upgradation of skills of ophthalmologists and paramedics, eye care managers and eye care finance management. Advocacy includes initiation and implementation of vision 2020 programmes, strengthening Govt. hospitals, generating and mobilizing funds for blindness eradication programmes, supporting training programmes and influencing change in medical education curriculum.

Although, the role of the DC-10 plane is limited to cities like Delhi and Chennai which have very good standards of eye care, the plane serves a larger purpose of creating awareness of eye care, training of ophthalmologists, establishing international norms of nursing and operation room standards by training nurses and paramedics. Along with the ORBIS programmes, National Workshops on Corneal and Childhood Blindness are also being arranged with involvement of Govt. and NGO bodies to formulate policies for the country. A local host committee invites the plane and NPCB (National Programme for Control of Blindness) is supporting the DC-10 programme.

Along with this I understand that ORBIS is going to create eye care centres in Patna, Sitapur, Ahmedabad and Bhopal in collaboration with Rajendra Prasad Eye Care Centre of All India Institute of Medical Sciences. I would suggest early action be taken to commission these centres which will go a long way in providing eye care to these needy areas.

Recently, there was a meeting of cured ophthalmic patients, their doctors and a few social workers. One important result was discussed. The relationship between the patient and doctor extends to patient's family and doctor in medical care. This in turn transmits effective messages from one family to another family on advice to prevent the diseases, necessity of periodic checks, the dietary habits and the need for lifestyle changes including eye exercises for good health. Actually, I believe this good contact between the doctor and patients is comparable to that of a teacher and student. I request every ophthalmologist to play the role of a teacher in advising every family and visiting friends, on eye disease prevention and methods to maintain quality vision. I hope you all will find time for this noble action.

I would suggest the following three missions be taken up by ORBIS to promote eye care in India.

- (1) So far ORBIS has not been undertaking low vision services. I would suggest that a low vision service should be one of the prime areas for ORBIS during the next five years with partnership from national eye care agencies.
- (2) Airborne Ophthalmic Services can be multiplied with co-operation between India's eye care centres, ORBIS services and ISRO through a tele-eye care mission. It should be launched in the nation say in 200 centres particularly in the rural areas in north, east and west. This involves tele-connectivity through satellite communication in partnership with the eye care community. I suggest the International Agency for the Prevention of Blindness and Airborne Ophthalmic Hospital and Ophthalmic Centre can work together in this mission.
- (3) The national eye care agency in collaboration with ORBIS DC-10 programme can consider an airborne, road borne and mobile eye care service for difficult regions in the country.

My best wishes to all the members of the ORBIS team for success in their mission of eradicating blindness internationally.

Mission for Total Eradication of Leprosy

I AM DELIGHTED to participate in the Annual General Meeting of the Hind Kusht Nivaran Sangh (HKNS). I greet the Chairman and Members of the Hind Kusht Nivaran Sangh. I have chosen the topic for discussion in this meeting as “Mission for total eradication of Leprosy”.

I am happy to note that the total number of patients has come down from 4 million to 0.3 million during the period 1981-2004. Is it true? I congratulate the Hind Kusht Nivaran Sangh for making some contributions in achieving this result within the constraint of limited resources. However, I find the 70% of the total leprosy patients are concentrated in five major states Bihar, UP, West Bengal, Orissa and Chattisgarh. Concerted efforts are needed for diagnosing the causes for this situation and developing strategies by which we can bring this down to the level of less than one leprosy case per ten thousand population before the year 2005. It is essential that this should be done positively and should not be further shifted. This Sangh must enable implementation of the programme and monitor it. Also, there is a need to work out methods by which we will be in a position to rehabilitate the treated patients. By doing this we will be fulfilling at least one of the dreams of Mahatma Gandhi.

I was studying the efforts made by Gujarat for leprosy elimination, disability care and rehabilitation of leprosy patients. They have carried out a comprehensive programme in which the state government medical colleges, hospitals and non-government organisations have become active partners. Based on the needs of particular districts they have carried out reconstructive surgery camps and mega camps to treat large number of patients. The micro planning for achieving the

elimination integrated with the disability care enable targeted elimination of leprosy in States. I would suggest to plastic surgeons to come forward and enable free skin grafting and tissue regeneration for cured deformed victims.

Also a number of NGOs have sponsored the treated leprosy patients for training them in handicrafts and cottage industries, so that they can find productive employment in their villages or they could find self-employment opportunities towards rehabilitation. This model can be followed in UP, Bihar, Maharashtra and West Bengal.

I was studying the case of a person who had turned a new leaf in his life. He was also presented with the President's Award for the "Best Self-Employed Person". This being a great achievement in itself, his struggle was praiseworthy as he has risen above ostracism and the stigma of being a leprosy patient.

After 7 years of treatment in a Welfare and Rehabilitation Centre for Leprosy Patients, he is fully cured and runs his own telephone booth at a City Railway Station. This model should be followed by other rehabilitation centres in the country to make the treated leprosy patients feel normal to function in the society. All our NGOs should study such cases and provide treatment and rehabilitation with compassion. NGOs can make use of the rehabilitated patients to work on leather-craft, tailoring, printing, knitting and software units. I had visited Raphael, the Ryder Cheshire International centre at Dehra Dun where an NGO is actively involved in rehabilitating leprosy, tuberculosis patients and also arranging education including skill imparting education of the children of leprosy patients. It is essential that cured patients must be integrated with the society. Social isolation is deadlier than the disease.

Early detection of the disease is essential in order to avoid permanent nerve damage and deformities. This will need survey of the population and detection. We need to educate the population about facts, the signs and cure for leprosy.

Multiple Drug Therapy (MDT) a combination of the anti-leprosy drugs such as rifampicin, clofazimine and dapsone has been found to

be a very effective treatment of the disease. This can be followed by government and non-government agencies working in treatment plans. Patients who have developed deformities/disabilities would need special care in providing suitable jobs which will ensure non-recurrence of the disease and also does not cause discomfort while working.

In endemic districts domiciliary treatment should be provided through staff trained in leprosy. For this purpose states who have successfully combated leprosy could help other states to follow their model. In moderate and low endemic districts treatment can be done through mobile leprosy clinics. We should organize health education to the patients, their families and the community to increase awareness and to remove the stigma among the treated patients. Religious leaders must clearly say that leprosy is not a communicable disease and patients should be treated as normal human beings, during their discourses. This should become the essential part of rehabilitation. Deformity and ulcer care should become the part of the rehabilitation plan. NGO working in difficult area could make use of this strategy effectively for eradicating the leprosy in a time-bound manner.

Real cure for elimination of leprosy lies in development of the region, that means developing the district, and the state. The development approach would provide for the people better amenities, clean drinking water, better hygiene and sanitation, better education and awareness, better health care, and nutritious food resulting in livable environment. This holistic approach is the vital need for eliminating leprosy in endemic regions apart from the symptomatic cure being provided to existing cases. I would recommend the state governments in participation with non-governmental organisations to identify the endemic districts and initiate developmental measures.

Presently, I understand that there are 285 voluntary organizations actively engaged in Leprosy Relief Services. These organizations are multi-functional. Their activities include case detection, case treatment, health education, referral, training, research and rehabilitation services. As far as Hind Kusht Nivaran Sangh is concerned you are mainly engaged in advocacy, co-ordination, information, education and communication services. Let us examine how this process can be



The President presenting National award on Technology to Indian Oil Corporation at a function in New Delhi on 30 June 2004

At the inauguration of the Golden Jubilee Celebrations of the Lalit Kala Academy in New Delhi on 9 August 2004





Addressing the Nation on the eve of the Independence Day in New Delhi on 14 August 2004

The President addressing Defence personnel at Campbell Bay (Andaman & Nicobar Islands) on 7 May 2005





The President presenting a set of books to the President of Zanzibar Mr. Amani Abeid Karume in Zanzibar on 12 September 2004

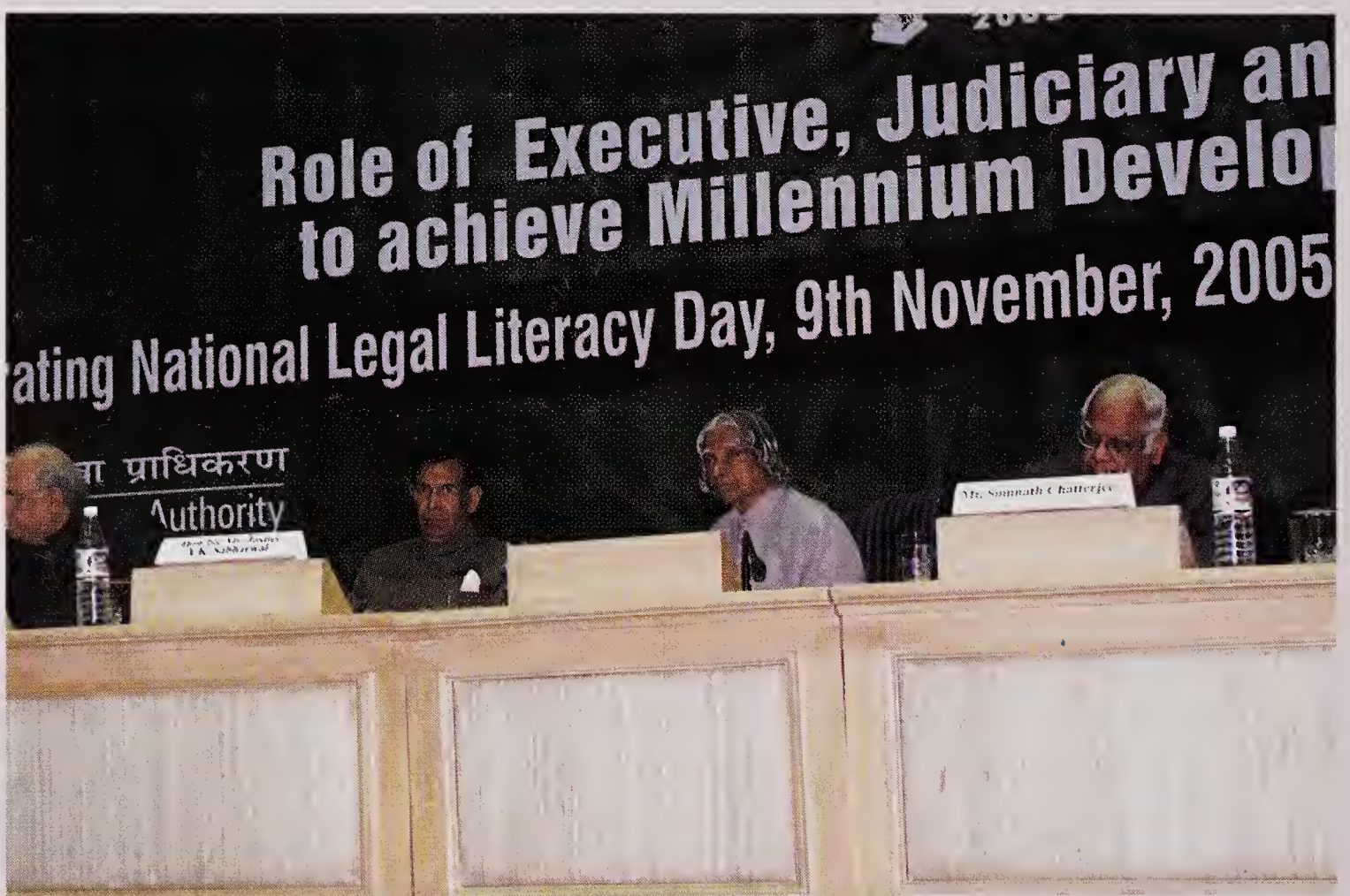
Addressing the Indian Community in Zanzibar on 12 September 2004





The President at the inauguration of a Surgical Workshop on Cochlear Implantation Programme in New Delhi on 5 November 2005

The President at the National Conference on Legal Empowerment “Unveiling Vision India 2005-2010”, and commemoration of National Legal Literacy Day in New Delhi on 9 November 2005





The President being greeted at the inaugural session of the 11th National Water Convention in New Delhi on 11 May 2005

The President with the Annual Sangeet Natak Akademi Fellowship and Award winners for 2004 in New Delhi on 26 August 2005





The President going round the Pavilion of the Ministry of Power at IITF-2004 after inaugurating it in New Delhi on 14 November 2004

The President being led in a ceremonial procession to the Central Hall of the Parliament to address the Joint Session of the Parliament in New Delhi on 25 February 2005





Inaugurating the “National Summit of NGOs of Rural India” in New Delhi on 25 April 2005

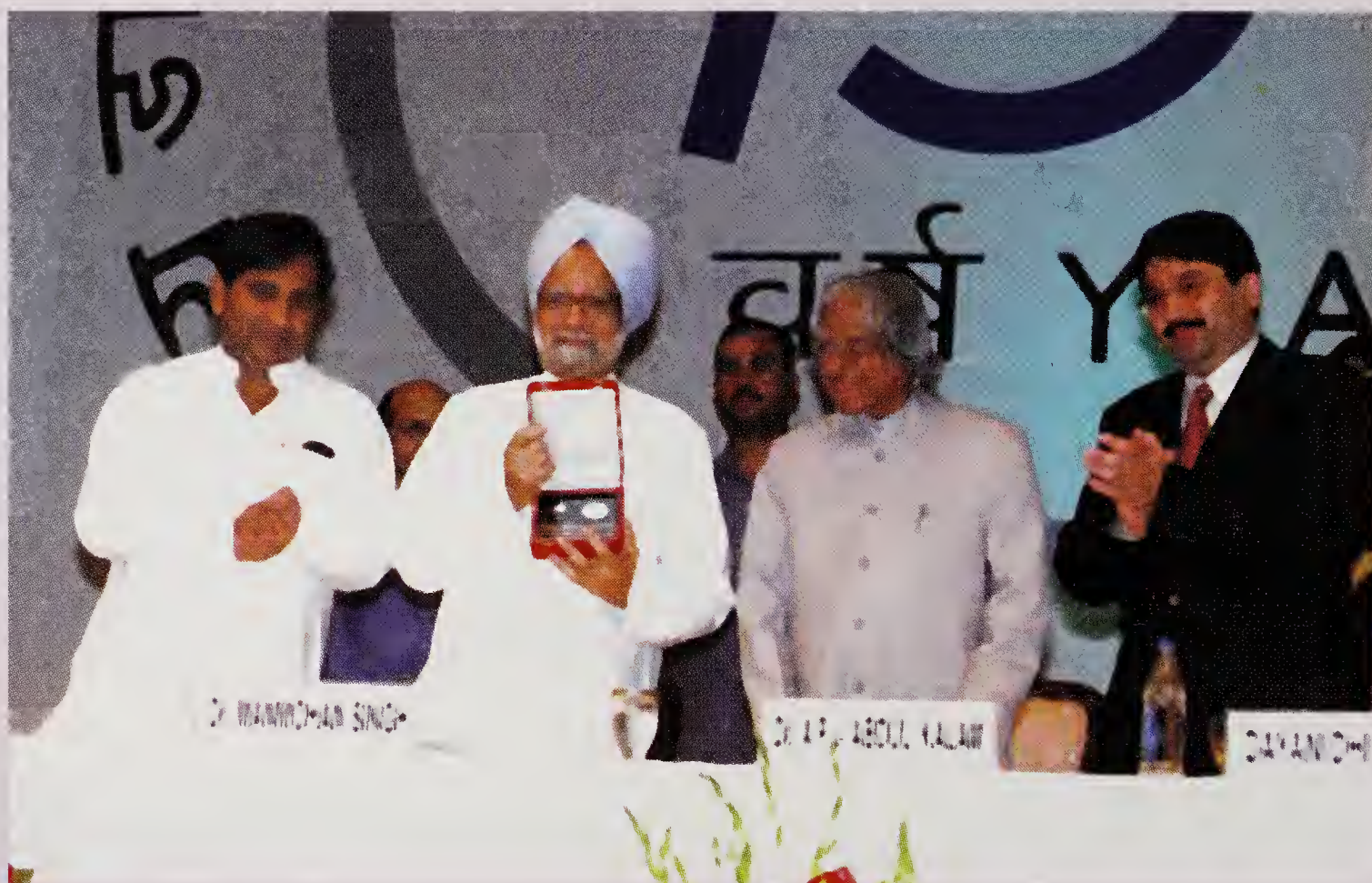
The President addressing Defence personnels at Campbell Bay (Andaman & Nicobar Islands) on 7 May 2005





The President meeting the differently abled children at Uhuru School in Dar-es-Salaam on 13 September 2004

At a function releasing a commemorative coin to mark the 150th year of India Post in New Delhi on 4 October 2004



intensified to detect leprosy cases so that they can be advised treatment. In this regard, I appreciate the project undertaken by HKNS for involving the school children in total population coverage for surveillance of leprosy and Multiple Drug Therapy (MDT) compliance. This technique can be used for faster detection of the cases through the involvement of large number of school children studying in different parts of the country.

Since Bihar, Jharkhand, Orissa, Chattisgarh, Maharashtra and West Bengal account for 53% of the cases, I would recommend the following action plan for eradication of leprosy in these six States by the year 2005.

- (a) HKNS can prepare an action plan for faster detection of leprosy cases using the children of all educational institutions located in Bihar, Jharkhand, Orissa, Chattisgarh, Maharashtra and West Bengal as programme facilitators.
- (b) The list of voluntary organizations working in Bihar, Jharkhand, Orissa, Chattisgarh, Maharashtra and West Bengal on leprosy eradication mission be compiled by HKNS.
- (c) A joint meeting be organized by the Hon'ble Health Ministers of all the voluntary organizations of these States for motivating them and getting their commitment to eradicate the leprosy in these six States in a time-bound manner. Also, the financial requirement for the task can be worked out in consultation with these organizations.
- (d) Based on this commitment, the Hon'ble Health Minister can arrange a meeting between the Prime Minister and the respective Chief Ministers / Governors of these States for getting the concurrence and support for launching of this mission in these States.
- (e) A Specialist who has successfully worked in eradicating leprosy in some other State may be appointed as the Mission Director for this eradication programme.
- (f) Funds required for this programme may be provided by the Health Ministry and it can monitor the programme on half yearly basis for providing the necessary mid-course correction.

The eradication of leprosy is a multi-dimensional task. It involves an integrated approach from NGOs, medical institutions, hospitals, rehabilitation institutions, development institutions, research institutions and small scale industrial units to eradicate the occurrence of the disease in a time-bound manner. I would request the participants in the programme to work with the theme 'Let my brain remove the pain' of the suffering community. Mission mode operation is required by the Central Government, State Governments and all the agencies working on leprosy eradication particularly in the States of Bihar, Jharkhand, Orissa, Chattisgarh, Maharashtra and West Bengal which account for about sixty per cent of the occurrence, so that the country is free from this disease before 2005.

Cancer Treatment : Challenges

I AM INDEED delighted to participate in the dedication ceremony of Sri Ramakrishna Institute of Oncology and Research. I greet the organizers, distinguished doctors, guests and dedicated nursing and paramedical staff on this important occasion. I appreciate the missionary spirit and dedication of the institute team in providing high quality and compassionate medical services and care to all sections of our society.

I would like to share a few experiences of people and their pain and possible solution. Last year, I was at the Centre for Cellular & Molecular Biology at Hyderabad. I met hundreds of young scientists working on the genetic origin and manifestation of diseases, particularly cancer. The young scholars very enthusiastically shared with me their knowledge of molecular biology and cellular research. They told me about the information encrypted on the DNA in the cell nucleus and how both problems and solutions to the human lives reside on the software that nature has embedded in each life it creates. In a way, these young minds were dealing with the questions that were so far confined in the domain of sages and philosophers.

Cancer, unlike many other diseases that come from the external factors, like infections, lifestyles and other environmental and physiological stressors, primarily emanates from within the cell. The life software embedded in the DNA material gets mutated and starts growing in a way that is not in-line with the surrounding cells. Many times when immune systems are impaired, life turns against itself. The tragedy becomes unfathomable when it happens too early.

Sometime back, I met one gentleman whose 6-year-old grandchild was on periodic blood transfusion for Thallesemia. The permanent

solution, doctors told me was a bone marrow transplant. The bone marrow of the child was not matching even between siblings and the parents. Unmatched bone marrow transplant is not done in India, I was told, and even in the West it is undertaken only in experimental situations. I met the child who was unaware of the time bomb that was ticking inside him. I prayed for him, for that was the only thing I could do. Today, standing before this gathering of cancer experts, I think I must share with you my concern for these patients who live under the shadow of uncertain life. What can we do to strengthen the doctors' capabilities in such a situation? Research on stem cell holds great promise. Maybe clinicians getting involved in this research will lead to breakthrough. We have a shortage of Bone Marrow Transplant facilities. Then there are emotional issues. When a person is diagnosed with cancer, in addition to the treatment, psychological support is needed in a big way. This support should be in the form of counselling and spiritual strengthening. Patient should be advised not to despair and retreat from the normal life. Courage to carry on with the life should be reinforced by persons living around. It is seen that properly supported by their families and friends, many cancer patients have discovered their inner selves while valiantly facing onslaught of the disease.

Treatment of cancer is very often multi-pronged involving unique combinations of radiation, chemotherapy and surgery. Genetic diagnosis can help to take good decisions while charting the course of therapy. On the drug side, instead of looking for agents that kill dividing cells, researchers are now looking for agents that encourage cell to get destroyed. Inside a growing tumor, the blood supply can be made to run short suffocating the deformed cells. Many drugs, called angiogenic agents, are now being used. However most of these drugs are imported and are very expensive. Industry-hospital-research institution consortia need to be established to develop affordable indigenous products.

Chemotherapy is often hazardous. It ends up destroying healthy cells in the vicinity and in the metabolic path of the targeted cancerous ones. A firm in Pune has developed algorithms describing interaction between normal cells, malignant cells and nutrients. The algorithms

also take into account the pharmaco-kinetics of the drug. Together with inputs on patient's age, height and weight and the type and volume of the tumor, the mathematical model can design an optimal drug schedule, minimizing the side effects. The type and volume of tumor can be automatically deduced by a combination of imaging and laboratory investigations. PET scans offer powerful techniques in this area. This is a good example of how advances in many disciplines of science such as biomedical engineering, image processing, control systems, mathematical modelling and pharmacology are helping in the development of better and effective treatment for cancer patients.

Palliative care, also called comfort care, is primarily directed at providing relief to a terminally ill person through symptom management and pain management. In situations where the cure is a foregone conclusion, availability of comfort and preservation of minimum essential quality of life remains an issue. We have to evolve well-rounded palliative care programmes to address mental health and spiritual needs.

Palliative care is best delivered in home settings. Community participation is therefore fundamental in organizing palliative care services. We have very stringent narcotics laws, which have to be reviewed in making available required chemicals to the palliative care networks. I understand many otherwise committed and well-meaning organisations are shying away due to this fear.

There are a number of hospitals providing cancer treatment in different cities of the country. It will be useful to network these cancer treatment centres enabling exchange of experiences among specialists leading to the delivery of best possible treatment. This type of interaction will also generate confidence among medical community to undertake treatment of complex cancer cases. During one of my visits I found that cancer centres have immunologists, physiologists and psychologists working together. This model could be followed by this institute to provide psychological support to the patients facilitating faster recovery.

Availability of comprehensive cancer centres like Sri Ramakrishna Institute of Oncology and Research is a significant step forward in

dealing with the most challenging health care problem of this region. However, we need an active connectivity of general practitioners with this centre to make a major impact in terms of reaching the needy as well as helping them out. The mission of offering the best available patient care, the most sophisticated education to physicians and patients and being the leader in the cancer research is indeed a very challenging task. This mission demands the highest of the human capabilities in intelligence, innovation and perseverance.

It is also equally important that the general public is educated about the health care risks of exposure to carcinogenic agents as a result of lifestyles and habits. To this end, education of children on this subject should begin as early as in the primary schools so that children do not get initiated into bad habits and thus remain immune from the impact of such disease. Let our new generation enjoy health and prosperity and do not succumb to the needless waste of human life. Cancer cure and cancer research are indeed twin challenges to the medico and health care community. Challenge transforms into mission of pain removal and thereby provides useful life that is close to the God.

I inaugurate the following facilities of Sri Ramakrishna Institute:

- the women cancer screening project,
- the Cancer alleviation and rehabilitation, and
- the 64 multi-slice CT Scan.

Providing Health Care in Rural Areas

I AM DELIGHTED to visit and interact with the Doctors, Researchers, Paramedical Staff and other members of the International Centre for Cardio Thoracic and Vascular Diseases at Parumala. My greetings to all the participants of this Unit for your health and happiness.

Cardiac care is a vital health care area for Indian community. I am happy to find that a high technology Cardio Thoracic and Vascular Diseases Centre has been created in a remote Panchayat in Kerala which is a dream for every rural Indian. This will be one of the models which can serve many NGOs who are going to contribute to health care in rural areas. It is also heartening to note that the Centre is sending medical teams to remote villages located in this region for screening the patients in the village itself. This is definitely a noble societal mission.

Kerala with its tourism potential is an important destination for medical tourism. This Centre here should cater to the needs of medical tourists and also provide quality health care to the people living in the rural area at an affordable cost. In this gathering I would like to discuss on the “quality health care in rural areas”. Since this hospital is located in a rural area, I would like to suggest commissioning an insurance model followed successfully in certain hospitals in Karnataka.

For providing comprehensive quality health care, we suggest citizens make a contribution of about Rs.5/- per month and a matching Government contribution of about Rs.5/-, which will lead to a Consolidated Health Fund of Rs.one crore per month for a population of ten lakh in certain rural clusters. The International Centre for Cardio Thoracic and Vascular Diseases may consider promoting such a scheme

in the villages located around this area which will enable provision of quality health care at an affordable cost for each of the villagers who become partners in this scheme. The scheme can subsequently be made applicable to all the districts of Kerala by the Government. This in my opinion is an extremely cost-effective method of providing quality health care to our rural population. This unique Health Insurance Model will include an Information Communications Technology-assisted Medical Advisory System and Health Awareness Education over and above quality medical and surgical treatment and services to all the people.

Multi-dimensional solutions are available for management of the diseases based on my discussion with experts. The solutions include medicinal treatment using Statins, which lower the cholesterol in the blood by reducing the production of cholesterol by the liver. Statins block the enzyme in the liver responsible for making excess cholesterol.

However, one has to be careful about the side effects and take adequate precautions while treating the patients. The second is through angiography and angioplasty using stents. Advancements in stents have resulted in the introduction of drug-coated stents which hold a tremendous promise in the near perfect treatment of coronary artery disease. I understand that very soon we may have bio-degradable stents. The next generation stents may be nano-stents. If the heart blockage is severe, valve defect and death of cells in the heart due to less blood supply etc., surgical intervention will be necessary.

We have all witnessed the treatment of cardiovascular disease moving from very invasive to less invasive methods. In the seventies bypass surgery was the big news, in the eighties it was balloon angioplasty and in the nineties it was the stent.

Now, moving a step further is a totally non-invasive treatment - External Counter Pulsation (ECP), a truly non-operative, non-pharmaceutical, safe and effective treatment which has made big news in the West. ECP is FDA (USA) approved and finds reference in medical and cardiology textbooks. Many favourable articles have been published in a number of reputed journals. The success of ECP can be judged from the fact that in USA the insurance sector reported

that the reimbursement for ECP has gone up by 6 % whereas that of other procedures like angioplasty, bypass surgery, etc. has come down by 7%. Now the treatment is available in most of the leading hospitals of the world.

In India, ECP is available at Sibia Medical Centre, Ludhiana besides Escort Heart Institute and Research Centre, New Delhi, Peoples General Hospital, Bhopal, Jamnagar etc. I am happy that ECP facility is being established at this centre also.

It is well known that following bypass surgery only 75% patients are symptom free for 5 years or more and only 50% after 10 years or more. The number of patients having recurrence after bypass, ballooning and stenting is increasing and for them ECP is the only FDA approved treatment available which is documented to increase blood supply to the heart by 20-42%, to the brain by 22-26% and to the kidneys by 19%. ECP also increases heart's output. More patients now prefer non-invasive treatments. With improved cerebral circulation patients may notice improved memory, etc. This centre may like to study this technique of ECP External Counter Pulsation for providing non-invasive cardiac care in this region as a complementary treatment regime.

There is a need to propagate the importance of appropriate food habits and lifestyle among the urban population to combat the situation of increased occurrence of heart ailments. Hospitals in the country should take proactive steps to counsel their clients in a family atmosphere for ensuring reduction in this number in the years to come.

It has been reported that the repeated occurrence of heart ailments is caused by diet, smoking, and lack of exercise and uncontrolled diabetes. All these factors can be controlled by an appropriate lifestyle intervention. I have seen the change of lifestyle pattern practically taking place in Global Hospital and Research Centre, Mount Abu. There was a joint project of Defence Institute of Physiology and Allied Sciences (DIPAS), DRDO and the Global Hospital and Research Centre for studying the effect of "holistic lifestyle intervention" on the patients suffering from Coronary Artery Diseases during the year 1997-98. The project involved both Control Group and the Experimental Group. The Control Group was subjected to conventional treatment whereas

the Experimental Group was supported by an intervention involving low fat, high fibre vegetarian diet, aerobic exercises and meditation. This three-dimensional psycho-physiological mind-body approach in treating heart patients of the Experimental Group resulted in dissolution of angiographic plaque and improvement in microcirculation of blood in heart muscles of the patients. The treatment was also supported by participation of spouses and other family members of the patients, leading to a unique family system approach to Medicare.

During my visit to various laboratories in India, I happened to see the beginning of stem cell research for different purposes including brain research. I would like to share with you an important stem cell research application in the field of cardiology. When I met Dr. P. Venugopal, Director, All India Institute of Medical Sciences (AIIMS) a famous cardiovascular and thoracic surgeon, he told me about his experiences. He said in one of the cardiac diseases, where conventional medical and surgical treatments were ineffective because of the affliction of the heart muscle, use of autologous bone marrow stem cells implantation into the diseased heart muscles had been applied in order to improve the function of heart muscle. This kind of application of this procedure is the latest and very few cases have been done in the world, the first time in India. This is expected to open new frontiers in the treatment of patients for regeneration of heart muscles, thereby giving new hope for the patients suffering from end-stage heart disease. I would request participation of many medical institutions in such a promising area of research.

Cardiac researchers have to recognize another potential area of research of nano-science which has already entered into diagnosis and treatment of diseases, particularly relating to brain cancer and heart. It is predicted that nano-robots will carry diagnostic probe and treatment solutions. Finally the robots will get digested in the human system after curing the disease. Sometimes I feel that the world may declare the early phase of twenty-first century, as a century of nano-science research and technology leading to revolution in human life enrichment. I would recommend to the Centre to take up research on the application of drug delivery system using nano-technology.

Ranbaxy For Indian Traditional Medicine

I AM DELIGHTED to participate in the inauguration of New Research & Development Centre of Ranbaxy. My greetings to the organizers, pharma technologists, chemists, doctors, academicians, industrialists and distinguished guests. I am happy to note that this R&D Centre is the third centre being established by Ranbaxy at Gurgaon with a focus on New Drug Development Research (NDDR) using New Chemical Entities (NCEs). The Centre will work in Medicinal Chemistry, Pharmacology, Infectious diseases, Bio-technology, Drug Metabolism, Pharmacokinetics and Herbal Drug Research. At this stage, let me pay my tributes to Dr. Parvinder Singh who had created a great vision to Ranbaxy well before a decade to excel in the new era of global competition and has enabled you to establish a number of units in different parts of the world. Now I would like to discuss on certain research areas that may lead India to achieve “Leadership in Pharma Industry”.

As you all know Johns Hopkins University in USA is doing a pioneering research work in medical field. I met Dr. Charles Cummings of the Johns Hopkins Board and his team, some time back. I asked one question that was in my mind, to Dr. Charles, “What made Johns Hopkins a world class medical research centre in addition to its cherishing societal missions?” His answer was, “it is a great tradition, and it started with a number of visionaries with value system and missions, working together. This tradition continues.” I am sure this R&D Centre of Ranbaxy can take a lead from the above model and can become a pioneer in establishing a tradition of excellence in drug research and success in global business.

Business symbolizes competitiveness. Competitiveness leads to economic growth. Competitiveness is a single factor which will decide

India transforming into a developed nation. Technology powers the competitiveness. Competitiveness leads to creation of a brand institution. The new R&D Centre could be a unique research centre for enabling Ranbaxy to become a global leader for certain classes of drugs. The use of right technologies in R&D will bring in the right non-linear growth in the pharma sector. When I visited Kiev, Ukraine recently, I found rows of chestnut trees on both flanks of highways interspersed with Ranbaxy boards. It was a beautiful sight to see. When I met the members of Ranbaxy and other pharma industrial teams, I realized that you are working under severe competition. I am sure the present R&D work and global business development efforts will give you additional technological strengths to meet this challenge.

From January 1st, 2005, the Indian pharma industry faces a challenge of demanding indigenous design of drugs, which has a profound impact on global competitiveness and business viability. As India had come into compliance with the TRIPS protocol mandated by the WTO, a new IPR regime is already in position. This extends patent protection to new product inventions. The new product patent regime will effect a sea change in the way Indian pharma companies think and do business. I am sure the New Research & Development Centre will enable RANBAXY to meet this challenge better; as firm formulation of R&D based global business orientation has been made by RANBAXY as a part of its vision.

A report on “Health Care in India” has been prepared by a panel of leading doctors and medical technologists in the country. It reports the typical problems facing us for two decades in the health care and possible solutions through technology. The expert team has identified three major diseases, viz. tuberculosis, HIV and water-borne diseases, by next decade as methods to combat the diseases. This Health Vision document was studied by Dr. Parvinder Singh with TIFAC team. Ranbaxy took a decision to include disease-based drugs in their product profile. Let us further discuss some of the emerging technologies, which will have tremendous influence in the field of drug delivery.

India missed the great opportunity in partnering the human genome project and thereby lost the utility of right type of data. I suggest to

the Indian biomedical community to take the initiative to become a working partner in the proteomics project of gene characterization. Proteomics is the study of all the proteins expressed by the genome of a cell. It is the logical extension of genomics. Proteomics helps to understand the basic biological processes critical to normal cellular functions as well as the development of diseases. It identifies the essential components of these processes and exploits these components as targets in the development of new methods to prevent or treat diseases. The national programme on proteomics has to be accelerated with partnership from industries and R & D laboratories. I would suggest that this should be pursued as a mission mode project. The proteomics resulting into a gene chip can become the future diagnosis and treatment regime for many diseases. The new R&D Centre of Ranbaxy must be aware of the progress made in the proteomics programme and understand the processes at the molecular level so that the genetic characterization leads to forecasting and diagnosis of the disease for adopting suitable preventive and curative measures.

Last year I visited Dr. Cherian's Medical Centre at Chennai. It is known as International Centre for Biomedical Sciences and Technology (Research & Applications). There I interacted with Dr. Emmanuel, who is working in the area of Gene Chip. He says the gene chip can be used for finding the existence of genetic diseases including coronary artery diseases or neuro defect in the baby during a certain stage of pregnancy itself. The chip could also be modified to adjust to the patient's system to develop those chemicals which in turn will help the patient recover from the present situation. The specialists assembled here must debate whether gene chip can be used for identifying the susceptibility of the baby to the allergic diseases in the advanced stage of pregnancy. Can medical bio-informatics help in finding a treatment regime for the mother which may give immunity to the child from the allergic disease? The new R&D Centre of Ranbaxy should work with research centres for maximizing the application of medical bio-informatics for diagnostics and determination of treatment regime.

It is reported that gene differences between humans and most animals are very nominal. More than 90% of our DNA is similar.

This property is a boon to researchers since animal models can be subsequently used for curing human diseases based on trial data. I would recommend to the medical researchers to progress further in this area for finding the application of gene chip as a diagnostic tool and as a treatment regime for allergic diseases and asthma.

Nanotechnology is knocking at our doors, which has wider applications. With the emergence of nanotechnology, there is convergence of nano bio-info technologies resulting in new devices which have wider applications in structure, electronics, and health care and space systems. It will be the central focus for many technologies to converge and open a large number of applications. Further, this technology will have a large domestic market potential leading to a robust economy. Nano-bio medical sensors will play a major role in glucose detection and endoscopic implants. Nanotechnological application to drug delivery system will revolutionize the health-care to a large extent.

The world market in 2005 for nano materials, nano tools, nano devices and nano biotechnology put together is expected to be over two hundred billion dollars. I have come across a number of patents being filed by Dr. Maitra of Delhi University especially in the area of drug delivery system. I would suggest, the members of this Research Centre may like to explore this area for nano technology application and if necessary create national and global partnership to get strategic leadership in this emerging area.

In India many R&D organizations and pharma industries discover the molecules, but most of these newly discovered pharmaceutical molecules are sold to multinationals abroad for further development into drugs. Naturally, the benefit of value addition goes to the companies abroad. The research and drug design, development and acceptance for introduction are a big mission. Molecule to drug is indeed the business of strong minds with the capacity to take calculated risks. In this connection, I recall the principle taught by my Guru Prof Satish Dhawan, “If one takes challenging tasks, problems will always occur. But problems should not become masters of the doers. Instead the problem has to be defeated and we should succeed.” I am happy to

know that this Research Centre is going to work on discovering new molecules and transform them into drugs with special focus on drug development for respiratory disorders, urinary tract infection, metabolic disorders and novel antibiotics for upper tract infection.

I would like to share my experiences while I was in Anna University, Chennai. One of them resulted in getting a patent for a new molecule discovered from a herb as an anti-cancer drug. This came out of the fusion of two great minds, one was a biotechnologist and the other was a traditional Siddha medical practitioner. The traditional system of medicine like Ayurveda, Siddha etc. have advocated and practised preventive and curative medicinal recipes specific to individuals. The body, mind, food and environment were looked at holistically to suggest a preventive or curative approach to health. Medicinal plants offer enormous scope for development of drugs. We need to create database of traditional medicinal plants for specific bioactivity and for leading to development of new drugs. India has got tremendous opportunities for herbal farming and research. I understand that R&D Centre of Ranbaxy has got partnership with Centre for Biotechnology of Anna University in realizing certain special formulations. The R&D Centre is also collaborating with CIMAP Lucknow, IIT Roorkee and CDRI, Lucknow. This partnership definitely will lead to drug discovery.

The traditional medicines are generally used within the country. International marketing will need the products to go through standardization and series of tests prescribed by the relevant approving authority. Ranbaxy can provide leadership in standardizing the traditional medicine drugs towards achieving the international standards. Your success will spread in the country for the development and marketing of Indian traditional medicine.

I have given some possible new areas which can be launched by Ranbaxy during the next decade:

I can trace back the movement of Ranbaxy from 1961 from where you have progressed from a manufacturer of bulk drug to become one of the leading global generic drug companies today. Now Ranbaxy has also moved on to become a research-based drug development

and manufacturing organisation. Your entry into Novel Drug Delivery System and New Chemical Entities will truly ensure your achieving the vision of becoming a research-driven global pharma company. In this process you have created a strong capability in Current Good Manufacturing Practices (CGMP) and a capability to go through the rigorous US-FDA approval. Let me share with you a few thoughts:

- (a) Ranbaxy can aspire to become the first in global generic Pharma market by 2010 through R&D.
- (b) Second area is New Molecule Drug Development. I understand you have acquired a malarial drug molecule and you are progressing towards clinical trials. You are also working on a few new molecules which may enter the market by 2007. You must enlarge your vision to fix a higher target of putting at least five new molecule drugs in the global market by 2010.
- (c) Third area, you can pay attention to, is Orphan Drug Molecule which is controlled by the low volume need, specific to the particular country. Business volume may not be high initially but once developed many applications can follow leading to profitability. In addition to profitability, the drugs developed will serve the purpose in the third world and also enhance the R&D capability of Ranbaxy as a global player.
- (d) Time has come for the Indian pharma industry to become multinational as an individual company or consortium competing in global market.

This will be a fitting tribute to Dr. Parvinder Singh and to our country, which was a leader in medical sciences, during the early centuries of the first millennium.

While inaugurating the Research & Development Centre of Ranbaxy, I wish you all success in your mission of developing, producing and marketing cost-effective quality drugs and delivery systems in the global arena.

Providing Equitable Health Care to All

I AM DELIGHTED to participate in the inauguration of the Forum-9 meeting of the Global Forum for Health Research. I am happy to note that the Global Forum is working to change the priorities governing how existing resources for health research are used. The conduct of the 9th meeting of the Forum in India provides an opportunity for a larger number of participants from India and adjoining countries to benefit from the deliberations of the meeting. I greet the members of Global Forum for Health Research and the co-hosts, Ministry of Health & Family Welfare and the Indian Council of Medical Research. I would like to discuss the topic “The Research Challenges of Health care”.

Recently, I met Dr. Charles Cummings and his team of the Johns Hopkins University Board. I asked what was in my mind, to Dr Charles, “What made Johns Hopkins a world class medical research institution in addition to its cherishing societal missions?” His answer was, “it is due to a great tradition, and it started with a number of visionaries with value system, focused missions and the nature of working together. This tradition continues even now.” Indeed it is a great message from Dr. Charles. I am sure, every R&D centre in the country has its unique culture that comes out of research tradition, leading to the results of the research reaching the people in the form of medicines or vaccines. I recall, in India our institution L.V. Prasad Eye Institute at Hyderabad has set a tradition of providing quality eye care particularly with social commitment of 1:1. 1:1 implies one free eye care service for every paid eye care service provided by the Institute. Also, they have a tradition of excellent research in ophthalmology and spreading the mission to various parts of the country.

I realize the research to realization of approved medical products takes nearly 7 to 10 years. That means: when India in a year invents say thousands of molecules, at least 10 to 20 should graduate into an approved medical product. But if it is realized within the country it will be very cost-effective and also internal wealth generator. Recently, I have visited a number of public and private sector medical and pharmaceutical R&D centres. In every laboratory I was very happy to see a large number of scientists working in the frontier areas of pharma sector, particularly in the private sector which provides them strengths to become globally competitive. During the visit, I was reminded of 10/90 phenomena with certain exceptions. Based on the recommendation of Global Forum for Health Research, our R&D institutions should take up development of vaccines for malaria, anti-vaccine for HIV, a robust drug for TB and other water borne diseases on highest priority. The great tradition India nurtured over many centuries must emerge again and multiple health research centres must flourish.

When I read the 10/90 Report on Health Research 2003-04, certain thoughts came to my mind which I would like to share with you. Every country has a specific combination of sanitary conditions, nutrition, lifestyle and disease pattern. Naturally, the research has to be nation-specific and also in certain cases region-specific so that we can provide an integrated solution to the prevention or cure of a particular disease and correct the 10/90 gap. In this connection I would like to talk to you about a strategy adopted in a beautiful hill region in India which I am fully familiar with.

On 19th October 2002, I participated in the launching of a Mobile Clinic and Research Centre in Uttaranchal. This effort was piloted by the Technology Information, Forecasting and Assessment Council [TIFAC], the Government of Uttaranchal, Birla Institute of Scientific Research and many other agencies. After thirty-two months of its operation, I found this mobile clinic has been used in six districts of Uttaranchal and treated nearly 43,000 patients during this period. Among the patients treated, 48% belong to the below poverty line category. They have taken 9,600 ultrasound, 5,500 X-rays, 1700 ECGs

and nearly 20,000 lab tests. The mobile clinic has documented the disease profile of the patients in the region (six districts) which falls into the following categories: acute peptic ulcer, anaemia, anti-natal, chronic obstructive pulmonary diseases, hyper tension, pelvic inflammation, renal calculi, upper respiratory tract infection and worm infection. This type of analysis has been possible because of computerized system of clinic management introduced right in the beginning. Also, the mobile clinic has been used in regions which are normally inaccessible and where organized medical facility is not available. This, I consider as the best form of reaching the health care to the neediest people in the country. This is a low-cost solution with committed health care personnel and institutions. The clinical data provided by this model will be applicable for many hill zones. This can be one method of correcting the 10/90 gap. I am sure there may be many mobile clinic ventures in different parts of the country run both by Government and non-governmental organizations. What is needed is the networking of these facilities and integrating the data for providing a definite direction to our health care research. Mobile clinic will also provide research input for certain diseases prevalent in the hill area and tribal region such as pulmonary edema and sickle cell. The mobile clinic model can be followed by many states in India and other countries to enable medical facilities reach the common man.

Now I would like to discuss about health status of our country (India) and the specific measures needed for bridging the 10/90 gap in health care research.

India has made considerable progress in its health status since its Independence and particularly during the last fifteen years. At the time of Independence, the life expectancy of an Indian was less than thirty years. Between 1991-2005, the life expectancy of Indians has gone up from 58 to 64.35 years, infant mortality has come down from 87 to 60 deaths per 1000 live births and population growth rate has decreased from 1.9% to 1.4%. Still infant mortality is very high. We have to bring it to the level which has been achieved by Kerala.

Let us look at some of the statistics. This data pertains to 1998 and 2003.

Disease status in India : 1998 and 2003

S.No.	Diseases	1998	2003
1.	Tuberculosis	12,300 (550)	3.5 lakh (16,000)
2.	Malaria	22 lakh (644)	18 lakh (943)
3.	HIV / AIDS	3.4 million	5.1 million
4.	Cancer	6.3 lakh	7 lakh
5.	Sickle Cell	10 lakh	25 lakh
6.	Polio	1934 per year	225 per year (It has further reduced to 27 in 2005)
7.	Diarrhoeal Disorders	96 lakh (7100)	96 lakh (2800)
8.	*Japanese encephalitis	3,400 (680)	1,500 (344)

Note: Figures within brackets indicate the fatal cases.

*Recently the Japanese encephalitis has considerably increased in UP.

I would like to briefly talk to you on some of the diseases and the actions proposed. Our experiences will definitely be shared with the third world developing nations in order to provide health care for all.

There is an effort to bring the entire country under the Revised National Tuberculosis Control Programme (RNTCP). So far, 93% of our country has been brought under this programme and by October 2005 the entire country will become part of this programme. This will ensure that at least 75% of the total tuberculosis cases are detected every year and brought under direct surveillance. The treating agency

must ensure that at least 80% success in fully curing the disease is achieved within the year. If this regime is followed continuously for over ten years our tuberculosis load will come down to less than ten per one lakh of population. For achieving this it is also essential to work faster on the development and clearance of new drugs which are in the pipeline.

Modern medicine has always relied on newer scientific inventions. Many of the world inventions have been used by Indian health care systems, effectively. India has also made significant contributions in developing drugs that are critically required for India. One of the achievements comes from a laboratory of the Council of Scientific and Industrial Research (CSIR). CSIR lab has developed a new therapeutic molecule for tuberculosis. This molecule has shown the potential to cure TB in around 2 months, as against the standard treatment of 6 to 8 months. This breakthrough is very important. After completing the pre-clinical studies, the molecule transformed into a drug called Sudo-terb is scheduled to undergo clinical trials in humans. This development has been done as a public-private partnership involving the Lupin, the three CSIR Laboratories, namely, Central Drug Research Institute, Indian Institute of Chemical Technology and National Chemical Laboratory, and the University of Hyderabad. It is hoped that the drug will be in the market soon after the clinical trials. In addition to the above, there is also a need to develop a more effective vaccine against tuberculosis. The combined action of surveillance, detection and disciplined treatment have to work together to ensure faster cure of existing cases. Prevention of future cases has to be achieved through R & D efforts of developing new breed of vaccine and medicines. The collaborative action is needed between health care personnel, doctors, researchers and the pharmaceutical companies both in the private and public sectors to accomplish this mission.

Incidence of malaria has reduced from 22 lakh to 18 lakh in the period 1998-2003. However, the death cases have increased from 644 to 943. I understand that the conventional medicine used for treatment of malaria namely Chloroquin has become resistant to Falciparum which causes cerebral malaria. Our scientific community has developed and produced a drug named Arteether from Artemisinin

which has been found to be an effective cure for cerebral malaria. I understand that this drug is being exported to over forty countries. Also, Ranbaxy has acquired a malarial drug molecule and they are progressing towards clinical trials. The fully developed drug will be available in the market soon. This will be another important milestone in the treatment of malaria.

Over the years I find that in spite of our efforts there is no rapid reduction in the occurrence of malaria cases in the country. While taking up new projects it is essential to have multi-faceted inter-sectoral collaboration between various partners so that the impact assessment of the project on new type of diseases can be foreseen and suitable preventive action taken to contain the disease. In addition to this we have to improve the surveillance, develop rapid diagnostic kit and use the conventional prevention methods of spraying to control the vector. International Centre for Genetic Engineering and Bio-technology in collaboration with Bharat Bio-tech has developed a vaccine for malaria which will go for toxicity trials on animals. There is a need to speed up such projects so that they will benefit the entire community who are affected by malaria in different parts of the world.

It is reported that in India the number of HIV infected people is on the increase. It is critical that the transmission of HIV infection is prevented. An effective vaccine that can prevent this disease will be a cost-effective tool for control of infectious diseases. There are three sub-types of viruses classified as A, B and C. I understand that Indian population is largely affected by sub-type C virus.

There are two candidate vaccines presently considered for use against sub-type C virus in our country. In view of the urgency of finding a cost-effective vaccine the expert group reviewed the vaccine candidate for HIV sub type C in the pipeline. Adeno-Associated Virus (AAV) based vaccine with HIV-1 sub type C (African strain) developed by Targetted Genetics Corp., USA was found to be in advanced stage of test in different parts of the world. This HIV vaccine (tgAAC09) is now undergoing Phase-I trial for safety and immunogenicity assessment in healthy HIV uninfected volunteers at National AIDS Research Institute, Pune.

The Indian vaccine has been developed by scientists from National Institute of Cholera and Enteric Diseases in collaboration with National Aids Research Institute, Pune and Therion Biologics, USA. This is a recombinant vaccine containing six genes from HIV 1-C strain. This vaccine was developed from the virus isolated from National Aids Research Institute, Pune. This will go into Phase-I trial in healthy uninfected adults at Tuberculosis Research Centre, Chennai during this year. Both these programmes are being progressed as a joint venture between ICMR, National Aids Control Organisation (NACO) and International Aids Vaccine Initiative. In addition to these two vaccines a DNA based vaccine and SFV vaccine are also under development.

Time has now arrived to take up this development in a mission mode so that an effective vaccine will be available for our country within the next two years. Simultaneously, I would suggest that the medical community must start working on the development of anti-vaccines for sub-type A and B also. This will go a long way in correcting the 10/90 gap.

The treatment for cancer is prolonged and expensive. A common man in the rural area may not be able to sustain the financial burden. In that respect I am very happy to find that certain institutions like Karunya Nilayam in Kerala is providing free medicines, free noon meals and free accommodation to a large number of patients. This is a very important societal mission.

Karunya Nilayam has initiated a programme of screening of children in the rural areas and providing total treatment for over hundred cancer affected children. Such societal missions must be carried out by a large number of charitable and philanthropic organisations to remove the suffering of the people from this dreaded disease. As a first step we can contain the spread of the disease through education, to know some of the causes needing lifestyle change and removal of environment hazards. As a second step citizens can be advised to report immediately to the doctor if they find anything disturbing in their routine or anatomy. This is where the periodic screening of all women between the age 35 and 60 through mammogram and papsmear

will help against breast and pelvic cancer. Advancement in cancer treatment has resulted in the development of precision radiation and tumour-targeted therapies. Latest technique uses nano-technology-based genetic transfer.

When I visited Chattisgarh, I was informed by various authorities that sickle cell anaemia disease is prevalent in certain tribal areas and even in the adjoining States. I understand over 25 lakh population suffers from this disease. Life expectancy of this population is low and it is reported that this disease is a silent killer.

Sickle cell disease is an inherited condition. Two genes for the sickle haemoglobin must be inherited from one's parents in order to have the disease. A person who receives a gene for sickle cell disease from one parent and a normal gene from the other has a condition called sickle cell trait. Sickle cell trait produces no symptoms or problems for most people. The severity of sickle cell disease varies tremendously. Some people with sickle cell disease lead lives that are nearly normal. Others are less fortunate, and can suffer from a variety of complications. Some of the common symptoms seen in the patients suffering from sickle cell anaemia include (i) anaemia, (ii) intermittent jaundice, (iii) severe joint pains, and (iv) recurrent infections. These symptoms appear between the age of four and five, and severity increases with advancement of age. The available treatment strategies can be divided into anti-sickling agents, vasoactive drugs, bone marrow transplantation and gene therapy. Dr.Kmiec had shown that the new gene repair technology may hold promise as a treatment for sickle cell anaemia and other diseases by correcting the DNA mutation from which they arise. The medical researchers have to take up this task in all earnestness and find a comprehensive treatment for this disease.

Through the persistent efforts of the Government and non-governmental organisations the occurrence of polio cases has come down from 1934 in 1998 to 225 in 2003. And it has further come down to 27 in this year. There are certain districts in UP where the occurrence is still prevalent. We need to establish the causes of such occurrence and find remedial measures so that we can eradicate the

occurrence of Polio from these districts. We can adopt a special strategy for motivating the families to bring the children for vaccination. There must be a system to watch the health care requirement of every newborn child in the families in the villages and towns of these districts. Once the record of the children is available the health authorities must persistently go to the parents and educate them on the necessity for immunizing the child against polio. They must also be told that there is no side effect for the child due to polio vaccination. Also, it may be advisable to have polio camps in these villages on a monthly basis using a mobile clinic so that all the children in the age group of newborn to five years are immunized during these camps. The children who are not brought for immunization should also be tracked and it may be necessary to send the doctor or nursing assistants to their homes for providing the immunization. Presently, among the four polio strains P-2 has been eliminated. P-3 is virtually on the way out. We need to eliminate P-4 and P-1. Once we know the exact strain it will be ideal to use the monovalent vaccine instead of the regular trivalent vaccine. This will ensure faster containment of the strains.

I understand that pharmaceutical companies are in the process of developing appropriate vaccines for cholera, diarrhoeal diseases, dengue and Japanese encephalitis. These programmes have to be done in a mission mode to ensure availability of these vaccines in the market in a time-bound manner. Also, there is a need to mount a programme for development of vaccines for Kala-Azar.

The new theme of vaccine inventions in the future will be combination vaccines. These vaccines will be helpful in providing immunity against many diseases with just one injection leading to lower investment, less number of doctor visits and above all lesser patient complaints. Since India has already mastered the recombinant DNA technology like Hepatitis-B, human insulin etc. collaborative research work must commence to produce combination vaccine covering many diseases.

Human disorders can be classified into three broad categories. They are genetic disorders, disorders due to cellular function deficiency,

and disorders arising out of certain pathogens. Global Forum for Health Research can recommend intensive research for developing and producing cost-effective treatment regime for the above categories of disorder through —

- (a) Gene therapy and gene chip research,
- (b) Stem cell research, and
- (c) Combination vaccine and pathogen-specific antibiotics.

This could lead to cost-effective and safe treatment for the needy and improve the quality of life of mankind on this planet.

I had a discussion with Dr. Gullapalli N. Rao, Chairman and President of International Agency for Prevention of Blindness (IAPB) – Vision 2020. He has quantified that 50 million people are blind in the world today. 150 million are with low vision. He estimates, for providing complete eye care the investment needed is one dollar per person. That means, it is \$ 6 billion for the whole world. Out of which, \$ 3 billion has already been invested. The net requirement is \$ 3 billion. This \$ 3 billion can be mobilized through a group insurance scheme, with a nominal contribution of just 25 cents per person per annum. Similar Health-care Insurance Scheme can be replicated for providing total health care to all the citizens of the world. The Global Forum for Health Research (Forum-9), may like to consider adapting such a scheme for this global village.

I suggest that Forum-9 which is focusing on poverty, equity and health research can make the following recommendations to all its partner countries and assist in their implementation :

- (a) treatment of HIV AIDS as the highest priority area and networking of all institutions in the world working in this research so that an effective anti-vaccine for all types of HIV is developed and made available to the people by 2007;
- (b) integration of research efforts of malaria, typhoid, diarrhoeal disorder for facilitating development of combination vaccine by 2007 so that we can aspire a world free from all the three diseases within the next decade;

- (c) the commissioning of networked mobile clinic research centres in different parts of the world for providing first line medical cover and creation of data base on the disease profile of the rural sectors for enabling research towards prevention and cure of such diseases through medical and life style interventions;
- (d) conduct of impact assessment of environmental nutritional and lifestyle factors on the health status of individuals and disease burden so that pragmatic lifestyle practices can be generated for leading a healthy productive life and propagating the same amongst all the citizens; and
- (e) integration of actions of health care personnel, doctors, psychologists, researchers, pharmacologists, economists, social scientists and environmentalists for working towards the mission of providing disease-free health to all.

My best wishes to all the participants of the Global Forum for Health Research (Forum-9) in their mission of providing equitable health care to all the citizens of the world.

Vision for All

I AM DELIGHTED to participate in the World Sight Day organized by the “Vision 2020: The Right to Sight” and “Lions International” at Hyderabad. My greetings to the organizers, ophthalmologists, optometrists, medical social workers, medical technologists and distinguished guests. I am happy that four programmes, on “Andhra Pradesh Child Eye Health Initiative”, “Sight for Kids”, “Lions Diabetic Retinopathy” and “Sight First – II” are being launched by “Vision 2020: Right to Sight” in collaboration with Lions International. I would like to talk to you on the topic, “Our Mission: Vision for all.”

There is a continuous increase in the diabetes especially in the developing countries. An estimated 35 million people have diabetes in India. Urban India has almost four times the rates of diabetes in comparison with the rural India. Diabetic retinopathy is the most common ophthalmic complication of diabetics. The reported prevalence of diabetic retinopathy in India varies from 20 to 30%. By these estimates, we may have around 5 to 6 million persons with diabetic retinopathy. Blindness from diabetic retinopathy is fast acquiring the proportion of a public health problem. This is the right time to launch the diabetic retinopathy programme to build capacity among our medical professionals to handle this disease with adequate professionalism. It is important that the LV Prasad Eye Institute, in partnership with 14 primary and secondary eye hospitals, is organizing training programmes for ophthalmologists, optometrists and medical social workers on different aspects of diabetic retinopathy, particularly screening of target patients at peripheral eye hospitals and diagnostic and treatment through tele-medicine system.

A national mission for protocol-driven treatment has to be evolved involving mission-oriented doctors throughout the country. This team

should organize series of eye camps, reinforcing many eye hospitals with technology to cover larger population for the treatment. In doing so, integration of minds is possible and governmental support can be made easier. India already has a national programme for control of blindness and also “Vision 2020: The Right to Sight Initiative”. There is a universal sympathy to the visually impaired. This service-oriented attitude drawing on the sympathy can bring together a number of partners in the national mission.

The International Association for Prevention of Blindness can create a tele-Ophthalmology network using tele-medicine network of ISRO. Once we have the connectivity, then there should be a universal tele-ophthalmology system in place, and ophthalmologic specialists can come together in virtual clinics. A multi eye clinic environment with seamless two-way interaction between the doctors and patients will enable the eye specialist to diagnose the particular patient and also seek expert opinion from distance doctors located in remote areas. Such sharing of knowledge will provide cost-effective integrated treatment for the patients in the specialized areas like corneal blindness, surgical complications, posterior segment disorder and retinitis, etc. The same system can be transformed into a virtual ophthalmic institute from where a specialist lecture can not only reach any remote corner but also enable a good eye specialist in the remote area to share multicast information with others in the network. The same system can also be used to offer practical training to eye doctors on the intricacies of eye operation through a “Virtual Operation Theatre”. Such is the power of tele-ophthalmology. We have implemented a tele-medicine system in Rashtrapati Bhavan with CARE Hospital.

You are aware that approximately twenty-six percent of our population is still below the poverty line and medical care has to be provided to a large population. I was discussing this problem with some of my doctor friends and those connected with health care. I realized that the major problem in Indian health care delivery system including the area of ophthalmology is the near total dependency on medical imports of diagnostic and therapeutic equipment and devices including consumables. While the common man seldom buys anything imported, he is made to purchase or pay partly for the cost of the imported

gadgets for health care. This clearly brings out the fact that we need to create an infrastructure capable to produce our own medical devices, consumables and equipment, based on the technology available and to be developed within the country, at affordable cost. Certain initiatives were taken in this direction but a commercially competitive effort leading to production and service network is yet to emerge.

A consortium of ophthalmology institutions has to promote research and development of state-of-the-art ophthalmology equipment in collaboration with medical institutions and medical universities and industry.

The recent identification and characterization of progenitors with stem cell properties has opened new avenues that may be useful for treating functional impairments caused by the death of specific cell population. Stromal and neuronal degeneration are the causes of debilitating visual impairment associated with many ocular diseases, such as degenerative diseases of cornea, retinitis pigmentosa (RP), age-related macular degeneration (AMD) and glaucoma. The stem cells may help restore vision in the patient who has these diseases, by re-populating or rescuing the damaged ocular surface cells or retinal cells from further degeneration. The work done in the area by LV Prasad Eye Institute is pioneering, and other eye institutes in the country can follow this model.

The stem cell research has tremendous potential for ophthalmology. I suggest the International Association of Prevention of Blindness along with Lions Club International can join together with other partners and promote a research programme in stem cell based on the experience of LV Prasad Eye Institute.

The major eye care hospitals in the country namely, Arvind Eye Hospital, Madurai; Sankara Nethralaya, Chennai; LV Prasad Eye Institute, Hyderabad, JPM Rotary Eye Hospital, Cuttack; Sri Satguru Seva Trust, Chitrakoot; and Rajendra Prasad Eye Institute, New Delhi are rendering excellent eye care service in different regions. It will be useful to network all these hospitals through a tele-education network and share the experience of specialists in various fields of ophthalmology. They can have periodic tele-meetings in which the

special and unique experiences and the special strategies adopted by the doctors can be discussed. This will enable knowledge sharing and feasible solutions to certain special classes of diseases, which are being seen for the first time in a particular region. Also, the network can be used to conduct research on special areas including stem cell research. There is a need for multiple institutions sharing high cost research facilities. Above all, ego barriers are toughest to overcome.

Nano-technology is finding large-scale application in drug delivery system and biomedical application. The low dimensionality of many nano-structures, in which electrons are free to move in only two, one or near zero dimensions, has a profound effect on their chemical, electronic and optical properties.

Focal stimulation requires electrodes or groups of electrodes in the order of 100 nano metres or less with spacing of no more than 5 micron. Localized structures of this sort would stimulate the actions of rods and cones in the retina of the eye. This type of structure is fundamental to the possibility of developing an effective prosthesis device to restore vision in certain eye diseases.

All the major eye care centres in different parts of the country can jointly establish a Nano Technology Research Foundation in collaboration with international institutions for eye care and biomedical applications.

The pyramid model of eye-care delivery as focused by Dr. G.N. Rao is an excellent roadmap. It involves creation of a four tier system of treatment namely primary, secondary, tertiary and advanced tertiary care. In India, we have 20% vision centres for primary care, 70% service centres for secondary care, 50% training centres for tertiary care and 25% centres of excellence. We need to double the investment to provide full complement of eye care facility for all the four sectors with participating eye centres, government agencies and international partners. An integrated proposal based on the eye pyramid model can be prepared by the International Association for Prevention of Blindness India Chapter, Lions International and LV Prasad Eye Institute for submission to Ministry of Health, private sector industries, Lions Club organisations and philanthropists for necessary funding.

Recently, there was a meeting of cured patients, their doctors and a few social workers. One important point which emerged during the interaction was that the relationship between the patient and doctor extends to patient's family. This in turn, transmits effective messages from one family to another family on advice to prevent the eye diseases, necessity of periodic checks, the dietary habits and the need for life-style changes including eye exercise for good eye health. Actually, I believe this good contact between the doctor and patients is comparable to that of a teacher and student. I request every doctor to play the role of a teacher in advising every family on eye disease prevention and methods to lead a healthy life. I hope you will find time for this noble action.

'Defect-free vision for all' should be our national mission. The eye problems of the children can be corrected, if diagnosed early. Such programmes should aim at screening all the children. I am glad that today we are launching 'Sight for Kids' as part of the "Vision 2020:Right to Sight programme". Teams of paramedical personnel can visit nearby schools and villages and examine children for possible vision defects. Any one having defective vision or any obvious complaints should be sent to the nearest centre for further investigation and treatment. I have been asking the students to be helpful to their colleagues by bringing out special eye problem of the child to the notice of the parents or the teachers.

We need a very good ophthalmologic centre in the north-eastern states. The International Agency for Prevention of Blindness in association with Lions Club International can evolve a proposal for creation of a state-of-the-art Ophthalmologic Institute for submission to the North Eastern Council for consideration.

We have the best of doctors and technologists in India. We have core competence in design and software engineering. Emerging technologies in virtual reality and micro machines will transform the health care scenario. This transformation should lead to helping the people who cannot afford the modern medical care. To improve the availability of eye care facility to the rural masses, I recommend deployment of mobile eye clinics by all the eye care centres. I am

happy to note that the estimated number of blind people in India during the last decade has come down from nine million in 1990 to 6.7 million in 2002. We have to aim that in the coming decade it should come down to less than 4 million. One of the great qualities of human being as envisioned by Almighty is to give and give. What any one of us can give who is blessed with eye vision? When I see you all, members of International Association of Prevention of Blindness, members of Lions Club International and other agencies, professionals of LV Prasad Eye Institute, ophthalmologists and medical technologists, I find God has blessed you all to give the vision for thousands and thousands of our fellow citizens. In this direction if anything is needed I can certainly assist.

I am sure that the partnership of ophthalmologists, vision scientists and medical social workers will lead to high quality eye care which will enable India to succeed in the mission of “Vision for All”.

Hearing and Speech for All

I AM DELIGHTED to participate in the inauguration of 3rd Cochlear Implant Group of India Conference. I greet the organizers, ENT specialists, neurologists, audiologists, paediatricians, medical social scientists, medical technologists, device manufacturers and other distinguished guests. I am happy to note that the Cochlear Implant Group of India during the last three years has created a special awakening for the treatment of people with profound hearing impairment. Hearing and speech are the two important faculties given by the Almighty to the mankind among many others. The restoration of these faculties to the people, who do not possess them, is indeed a great service to God. I was wondering what thoughts I can share with this audience. I would like to discuss the topic “The Mission: Hearing and Speech for All”.

When I visited Vikram hospital in Coimbatore a few years back, I realized technological intervention is possible for bringing back hearing to the deaf and dumb children by implanting a device called Cochlear Implant. Dr. Aruna Viswanathan and her team demonstrated to me about the whole process of implanting the device and the subsequent training procedure to the children. I saw 4 year old deaf and dumb children. After one month of implanting and training they spoke out a few words legibly. After 6 months of computer-aided training, I have seen the children speaking normally. This touching scene moved me. I felt that I have to work to bring the cost of cochlear implant down, so that thousands and thousands of children in India and abroad can afford to have this device and lead a normal life. That is why I am with you today.

As per recent statistics, the number of people with profound hearing disability in India is about one million. In addition, there are over 1.2 million people with severe hearing disability, 0.9 million people with moderate hearing disability and 7.1 million people with very mild hearing disability. The medical community, social institutions and corporate houses have the task of removing the disability of nearly 10 million people with the support of the Government. The severe, moderate and mild category disability can be treated using conventional and digital hearing aids. Many ENT specialists spread across the country are doing this to a certain extent. But this has got to be intensified in the remote rural areas where people with disability suffer silently. Can we remove this pain?

Regarding the profound hearing disability, treatment is undertaken only in very few medical institutions since it needs a special device called cochlear implant, which I described to you earlier. When the child doesn't have the hearing capacity it leads to dumbness. Cochlear implant coupled with computer aided training helps the deaf and dumb individuals to regain near-normal hearing/speaking capabilities. Basically it is bypassing the damaged inner ear portion by replacing its functions with an electronic system having external mike, speech processing circuit, transmitter and a receiver. The receiver is implanted below the ear. The receiver has an electrode, which will be inserted into the cochlear portion of the ear. Speech processor processes the input audio signals and converts them into electrical signals in various channels. The transmitter transmits these signals to the implant's multi-channel electrode, which terminates in various points of the cochlear.

The latest cochlear implant technology, contour advance, recently introduced in India, is specifically designed to protect the small and delicate cochlea structures during surgery. This helps to preserve any residual hearing. Its curved shape also provides more focused stimulation of the hearing nerve for better quality outcomes. The further research in cochlear implant must lead to design and production of cochlear implants which will need minimum invasive procedures for fitment.

The fitment of cochlear implants for treating the profound hearing impaired cases started in India in the year 1995. In the beginning,

there used to be five or ten cases treated each year. Today, due to the awareness created by various institutions we are able to fit 150 implants a year. I am happy to know that among the hundred and fifty fitted, Army hospitals account for nearly seventy. In the last one decade we have treated nearly 750 cases in all. That means we are able to reach only 0.075% of the affected population in the country. There has been continuous improvement in the cochlear implants produced by international manufacturers and the cost of implant has also been going up. How do we reach all the people affected by profound hearing disability? This is what this conference must address. Then only we will be able to achieve the goal of providing hearing and speech for all.

There are three challenges in removing the profound hearing disability. One is a production of a cost-effective cochlear implant, second is less invasiveness of the surgical procedure and the third is kindhearted doctors who implant and train the patients further. Presently, the cost of implant works out to nearly Rs. 6 to 8 lakhs per piece and the total cost of the operation including rehabilitation will work out to Rs.10 lakh per patient. This cost is unaffordable for many people in our country. In many countries the cost of cochlear implant including the operation is borne by the insurance companies or the social welfare schemes. In the absence of such a scheme in the country there is a need to have a three-pronged approach to solve the problem. The corporate world can bear the cost of cochlear implant for fitment to certain number of patients as a societal mission. Secondly, there must be a concerted effort by Indian scientists and engineers in collaboration with ENT specialists, neurologists, audiologists and paediatricians to develop a cost-effective cochlear implant through a mission mode programme. Development tasks have to be undertaken in parallel by two or three groups. Thirdly, the Government can consider waiving certain levies presently charged on import of cochlear implants.

The people who are otherwise healthy in body and mind get isolated because of deafness. Helen Keller says if “I were to be born again with physical impairment, I would prefer to be blind rather than deaf, as deafness isolates more”. Hence it is essential to empower each child or adult with profound hearing impairment with cochlear implant

as the child will be able to hear its father and mother apart from music. I would like to narrate one experience, which took place on 2nd October 2005 at Rashtrapati Bhavan. To mark the 60th Anniversary of Mahindra & Mahindra, the management decided to donate 60 cochlear implants to hearing impaired. I inaugurated this programme. The other corporate groups and social institutions spread in different parts of the country can also participate in this noble societal mission and donate a certain number of cochlear implants to the needy patients. The Government on its part can provide 150% weighted deduction of such contribution for purposes of computing income tax.

Some development activity has been initiated to design, develop and manufacture low-cost cochlear implants in the country. This should be taken up in a mission mode by at least two groups and we should aim at bringing out the basic cochlear implant without frills. For example, I understand that the number of electrodes needed for realizing reasonable audibility is just seven whereas manufacturers use ten, sixteen and twenty two. Electro-physiologists for ears confirm that the audibility improvement beyond seven electrodes is very marginal and the designers should keep this in mind. I am sure the scientists, engineers, and the medical community assembled here will be able to take this challenge and bring out a cochlear implant within the next two years costing less than Rs.1 lakh. In this direction, I appreciate the initiative taken by DRDO. We must succeed in this development, so that we can offer this product to many needy patients, spread in different parts of the world.

Apart from the above two interventions, the government can consider waiving the custom duty and sales tax levied on the import of cochlear implant in the country. This will substantially reduce the cost of cochlear implant and the operation and make it affordable to certain class of people in the interim period while the indigenous development is in progress.

Recently, I studied the pyramid model of eye-care delivery as focused by Dr. G.N.Rao. It involves creation of a four-tier system of treatment namely primary, secondary, tertiary and advanced tertiary care. In India, we have 20% vision centres for primary care, 70%

service centres for secondary care, 50% training centres for tertiary care and 25% centres of excellence. We need to double the investment to provide full complement of eye care facility for all the four sectors with participating eye centres, government agencies and international partners. Cochlear Implant Group of India can study this pyramid model and prepare an ear-care pyramid model. An integrated proposal based on the ear-care pyramid model can be prepared by the Cochlear Implant Group of India for preventing deafness, for submission to the Ministry of Health, private sector industries and societal organizations for necessary funding.

‘Defect-free hearing and speech for all’ should be our national mission. The ear problem of the children can be corrected, if diagnosed early. Such programmes should aim at screening all the children. I would suggest that societal organizations could launch a “hearing and speech for kids” programme on the lines of ‘sight for kids’ programme launched by the Government of Andhra Pradesh. Teams of paramedical personnel can visit nearby schools and villages and examine children for possible hearing and speech defects. Anyone having defective hearing or any obvious complaints should be sent to the nearest centre for further investigation and treatment. I have been asking the students to be helpful to their colleagues by bringing out special hearing problem of the child to the notice of the parents or the teachers.

We have the best of doctors and technologists in India. We have core competence in design and software engineering. Emerging technologies in virtual reality and micro machines will transform the health care scenario. This transformation should lead to helping the people who cannot afford the modern medical care. To improve the availability of hearing and speech care facility to the rural masses, I recommend deployment of mobile hearing and speech clinics by all the ENT centres. One of the great qualities of human being as envisioned by Almighty is to give and give. What any one of us can give who is blessed with hearing and speech? When I see you all, eminent ENT specialists, neurologists, audiologists, paediatricians and medical technologists, I find God has blessed you all to give the hearing and

speech for thousands and thousands of our fellow citizens. In this direction if anything is needed, I can certainly assist.

Disability in general reduces the self-esteem of the individual and increases the dependence on others. Especially in rural setting, the disabled person is dependent on parents, relatives or friends. Our efforts must be to bring about a sense of equality and liberty among the disabled persons, either men or women. Equality can be generated by first liberating them from the causes of disability like hearing impairment. This can be achieved by providing assistive devices and systems, which will enable them to carry out their tasks without dependence on others. Also the disabled can be facilitated to achieve economic independence by providing them vocational skills consistent with their individual strengths. The committee of experts including representatives from corporate and voluntary sectors has identified around 120 occupations at executive / management / supervisory levels and around 946 occupations at skilled / semi-skilled / unskilled levels for employing disabled persons without compromising the quality of work. Organizations and industry should voluntarily come forward to offer these occupations to the disabled so that they can realize their economic independence and also have the satisfaction of contributing to the cause of nation building. This is the only way we can provide equality and liberty to the disabled brothers and sisters of our society.

My best wishes to Cochlear Implant Group of India and the cochlear implant development groups for success in their mission of providing hearing and speech for all.

NIMHANS for Neurosciences

I AM HAPPY to participate in the 10th Convocation of National Institute of Mental Health and Neurosciences. I congratulate the successful and meritorious students of the institute who are being conferred degrees and diplomas in various disciplines. I compliment the Faculty members for shaping the young minds and transforming them into valuable professionals. I would like to discuss with you the topic “New Challenges in Brain Research”.

NIMHANS is a place of sustained excellence in neurosciences for more than 50 years now. What started as a mental asylum, grew into a mental hospital to a very fine health care centre and research institution rolled into one. NIMHANS had continuously kept pace with the advances in neurosciences and brain research. It has cured several hundreds of thousands of patients every year. Such a continuous stream of patients would generate clinical data base. Since inception, this would have grown to be very high in volume and I am sure would be continuously used for your advanced research. NIMHANS should be a place for removing the pain of the people. But the research results have to address finding solutions to diseases like Parkinson’s disease, for which the cure had been eluding the researchers.

NIMHANS has to have a vision to enter into the most difficult area such as “is there any solution for mentally challenged children”? Neurons in the brain can be modelled in the supercomputers available today; they can be mapped and imaged by some of the high resolution imageries, they can be replaced by computer memories. Such capabilities which are arising out of advances in other areas such as information technology, biotechnology and nanotechnology, converge and combine

together to provide a technique of awesome power that only rivals the power of the Creator.

The convergence of advances in multiple disciplines of science and engineering will ultimately help the brain researchers to understand the genetic disorders. These disorders can manifest as mental disorders and create mentally challenged children. Stem cell research and gene chip application are going to play a very vital role in reversing many of the brain disorders. Can the brain researchers from NIMHANS and the young who are graduating today take it as a mission of their profession to find a long-lasting solution to the problem of mentally challenged children and bring them to the mainstream? This will be a God's Mission for you.

Since the graduates and teachers are mostly in brain research it is essential to understand the relationship between the human brain power and the incoming revolution taking place in the computer technology. For example, computer works through precise calculations and is extremely fast when it comes to quantitative numbers. The brain is extremely slow in this aspect. However, the brain can recognize speech, and remember faces better than even the best supercomputer in the world. This is because it works with more memory than computing units. The impact of the working of the brain on the computer architecture (bio-inspired computing) and the care of the brain inspired by computing elements (computer-inspired biology) would become the future in neurosciences.

When I was associated with Anna University in Chennai some time back, apart from my teaching activities on various societal transformation missions, I was guiding a doctoral research project. The research was aimed to find integrated solution using a software, hardware application to achieve a near normal functioning of the brain of mentally challenged children. When I saw some of the mentally challenged children performing certain activities like singing, painting in Central Institute of Mental Retardation, Thiruvananthapuram, I got convinced that one day convergence of information and communication technology, medical electronics, biotechnology and mathematical simulation can find a solution for their problem. We

have been studying the mentally challenged children in various research institutions, homes for mentally retarded and hospitals. We are confident that it will be possible to transform the functions of the damaged portion of the brain, say left hemisphere, to the normal portion, right hemisphere of the brain by some triggering mechanism, or by implanting a biochip to carry out those functions. This is a complex problem which needs an integrated approach involving medical scientists and technologists for a targeted permanent solution which can help children afflicted with this mental disability.

A neurological disorder that affects the functioning of the brain, that is autism, impacts the normal development of the brain in the areas of social interaction and communication skills. Children and adults with autism typically have difficulties in verbal and non-verbal communication, social interactions, and leisure or play activities. The treatment is not amenable exclusively through a scientific diagnosis. It has to be through physiological, psychological and neurological integrated care. Now, I would like to discuss the multi-disciplinary dimensions of schizophrenia.

The confusion between mind and brain has always perplexed the medical scientists. Answers to the questions like “What is the mind?” and “Who am I?” don’t lie in the domain of philosophers and psychologists alone. Molecular biologists and neurologists are formulating their own theories. This phenomenon leads to different types of situations. First there is a presence of energy system in the existence of a soul that enters and lives in a personality over a lifetime. This eternal entity is capable of both withdrawing into a slumber and tapping the universal energy of divinity and collective consciousness for its empowerment. Second, there is heritable sensory and biological component to the personality and behavioural traits. Third, as I understand, no definitive psycho-pharmacology recommendations are available for specific groups of patients with personality disorders. However, schizophrenia needs to be prevented at primary, secondary or at tertiary levels. Even if we are not in a position to prevent schizophrenia at the primary level, we may hope to arrest the disease at the secondary level. This may be facilitated if we have a supportive

socio-legal-political system. I suggest that psychologists, molecular biologists, neurologists and physiologists along with sociologists, lawmakers and politicians should all work together and find appropriate interventions for facilitating recovery and rehabilitation of such patients.

Personality and mental disorders start as nearly more than a normally unbalanced state of the psyche brought about by a certain chain of circumstances or happenings from birth which varies greatly from person to person and usually commences with the phenomenon known as psychological abandonment. The basics of this subject are simple. Every human being learns its first lesson of love as a baby and small child from its mother. If that did not occur, then that child will be susceptible to behavioural problems in later years because he or she has never learnt to love and cannot form a satisfactory relationship of any reasonable integrity or duration. There may be other factors but that is where it all starts. The medical technologists should mount a programme in which they should propagate the importance of preventing the feeling of abandonment among the children by their families. This can be done through their counselling and assistance programmes which they are carrying out among the patients and their families. More than treating the patient, it is important to emphasize the need for propagating love among the children, which could be carried to the neighbourhood by the suffering family members.

The personality consists of the physical body, the emotional body and the mental body. In a fully developed personality, the three vehicles are synthesized into a harmoniously working unit. This means that there is an alignment of the mind and feelings so that our outer actions are expressed in a balanced manner. It is the goal of every spiritually active person to create such an integration of lower self for, it is then only with the correct alignment of forces that consistent soul contact can occur. It is essential to make the actual link between the lower and higher selves to form a rainbow bridge. This way the soul's presence would become ever-increasing realities. Until a fairly advanced state of personal evolution is reached in which there is a fusion between the lower and higher selves, everything about the personality is either inherited or created and assumed temporarily. When the soul's presence enters and is experienced through the physical body, a very perceptible

change in our physical energy occurs. We appear to radiate. This radiance is felt and experienced by those sensitive enough to perceive it as warmth, a loving essence, quite different from the heat of natural vitality and sensuality. Such an enlightened person emanates a distinct physical energy which is not intrusive into the space of others, but nevertheless, penetrates and most often uplifts them. I would suggest the neuroscientists graduate themselves to this state of consciousness which will enable them to transmit their love and compassion to the community which will light the lamp of happiness amongst many families.

I understand that by proper stimulation of brain, we should be able to regenerate the lost neuron and thereby make the brain function better. Dr. T.R. Raju of your institute has reported that by intracranial self stimulation in rats, more neurons get created and it improves the learning ability and faster cure for injuries. Enriched environment is also capable of generating neurons using natural stimulation. Electrical stimulation needs insertion of electrodes in the brain and it can be highly pinpointed. We have to resolve ethical issues for resorting to this treatment among human beings. We may also try to explore the application of electro-magnetic stimulation non-invasively to stimulate the dormant neurons of the specific brain areas. Use of stem cells, neuronal transplantation and nerve growth factors may also be considered. I suggest intensive research should be carried out in this area for finding early solutions to treat mentally challenged patients through a multi-pronged approach. My research scholar is exploring the above possibilities and we see light on the other side of the tunnel.

I am happy to know about the initiatives and research activities of NIMHANS in molecular and cellular neuroscience, developmental neuroscience, neurovirology, systems neuroscience, theoretical neuroscience and computational neuroscience. One of the interesting areas for Indian scientists would be researching the Body-Mind-Spirit connection to understand a large dimension of consciousness. This would involve researching the Pineal Gland or the Pineal System. Philosophically viewed as a “sphincter to control the flow of thought”

or “seat of the soul” and scientifically recognized as an active endocrine gland or neuro-endocrine transducer organ, the Pineal involvement in cycles of growth and development during the lifespan has long been recognized. Pineal holds the key to find out solutions for many health problems. Pineal’s influence on other endocrine glands as “a regulator of regulators” and its role in immune response, thermoregulation and mediation of various biological cycles such as regulation of sleep and physiological adaptations to the environment, are being studied. Research indicates that pineal involvement in mental health may go beyond psychosis and that the Pineal plays a significant role in the manifestation of several mental illnesses such as schizophrenia and affective disorders. The link between Pineal dysfunction and suppressed immune response, and its characteristics such as sensitivity to variations in environmental light and electromagnetic influences, are the few areas which need extensive research. I also believe that there is a vast scope for Indian scientists to focus their research activities on the most significant aspect of pineal functioning, that is its role as the interface of mental and spiritual facets of the self with the physical body.

According to an estimate of World Health Organisation (WHO), brain disorders would be the greatest public health threat in the next few decades to come. A comprehensive human brain project is required to be progressed for tackling different diseases such as depression, sleep disorders, epilepsy, schizophrenia etc. with global participation from many countries. The project should aim at preparing a comprehensive structural and functional map of human brain and facilitate convergence of all activities pertaining to brain research in the Centre. This is indeed a challenging task which requires active participation and effective contribution of research institutions like NIMHANS, government agencies, academia and the entire medical fraternity.

Incidence of epilepsy in the country is fairly high. Present treatment for epilepsy using surgical or pharmacological control and management of the episodes involves quietening the hyperactive parts of the brain neurons. Is it possible to locate the specific focal point responsible

for the seizure through neural imaging by MRI or Positron Emission Tomography (PET)? Scientists working in nanotechnology can work with brain researchers to develop a small device which can be implanted in the brain close to the focal point which can buffer spurious high intensity spikes and can create a near normal brain function and thereby improve the quality of life of these patients. Can we target specific nano-tracers to the epileptic foci to carry out a similar function? It is quite a challenge which the centre can consider.

HIV is emerging as a major health care concern. Scientific evidence exists to indicate the relationship between HIV and cognitive functions of the brain such as memory, learning etc. Neuroscientists may need to address the pathophysiology of cerebral dysfunction in HIV positive cases. It will be worthwhile to explore the therapeutic potentials of indigenous systems of medicine including the herbal approach to circumvent the adverse effects of HIV on neuronal functions. This will be possible because of the multidisciplinary networking systems created by NIMHANS through its worldwide connectivity.

The complex nature of brain functioning engulfs in itself answers to many problems that need to be fully understood for human development. The structural and functional mapping of human brain would help in scientific analysis of human behaviour. During my recent visit to Switzerland I saw the researchers in Brain and Mind Lab (EPFL), Lusanne working on such a mapping. Through rigorous and extensive research findings, if it becomes possible to analyze behavioural tendencies and derive an inclination or aptitude pattern of a person, especially at an early age, it will help the person to opt for that field or area, for optimum utilization of the human potential and talent. It will also enable early detection of negative emotions and projection of concealed destructive tendencies in a child, which can be dealt with by providing various clinical and psychological treatments and ensuring a conducive atmosphere for strong physical and mental growth of the child. Such balanced and healthy development of one's emotional intelligence will lead to evolution of a truly enlightened citizen. Hence, I would suggest to NIMHANS to undertake a research programme to determine the correlation between clinical

data and the performance of individuals in different activities. Such data over a period of time can culminate in evolving a battery of tests which can be used by the schools and social organizations for guiding the children towards their appropriate career path.

NIMHANS is a unique institution, engaged in developing human resource and medical research. Availability of a powerful combination of clinical sciences with basic and applied science in one institution is the core-competence of NIMHANS. The institute has harmoniously addressed both local needs and national priorities, while partnering with professionals from within the country and abroad. The reputation enjoyed by NIMHANS is an ideal launch pad for the passing out graduates entering into a new career with a self-designed trajectory.

Graduation is indeed a time to celebrate the recent past. It is a culmination of your hard work, dedication and determination. This is the time we must think of the future. You should introspect, redefine your goals and consider how your individual aspirations can lead to the collective good of our fellow citizens. All of you must ask yourself a question “what will I be remembered for?” This question will enable you to set your long-term goal and work for it.

Once again let me congratulate all the graduates passing out from this institute today and my best wishes to the members of NIMHANS in their mission of creating health care professionals with state-of-the-art knowledge, nobility and compassion.

Tele-Medicine for People in Remote Areas

I AM HAPPY to visit Christian Medical College (CMC), Vellore, and deliver the Dr. Ida Scudder Oration today. On this day I am reminded of the dedicated service rendered by Dr. Ida Scudder who started a single bedded hospital in Vellore, which has now grown into a hospital with over 2000 beds with 117 specializations. As a gynaecologist she used to go to the villages, meet people, and treat them. Today people from many parts of the country and other countries such as Bangladesh, Pakistan, Sri Lanka, and Myanmar visit the Centre and seek quality treatment. CMC Vellore has pioneered in the field of open heart surgery, renal transplant and bone marrow transplant. It is amazing to find that this hospital employing over 5,000 members in all including doctors and paramedical professionals, treats 4500 out patients and 2000 in-patients, conducts over 100 operations and looks after 30 births in a day. In addition CMC gives the country 60 doctors, over 90 post graduate doctors and 23 super specialists. Also, the CMC trains over 150 nurses and 190 paramedics. This is an important human resource development activity for the nation. My greetings to the specialist doctors, nurses and para-medical personnel, support staff and medical students. I have selected the topic for the oration today as ‘The Research Challenges of Health Care’.

Recently, I met Dr. Charles Cummings of the Johns Hopkins University Board, and his team. I asked him a question which was in my mind, “Dr Charles, What made Johns Hopkins a world class medical research institution in addition to its cherishing societal missions?” His answer was, “it is due to a great tradition, and it started with a number of visionaries simultaneously with value system, focused missions and the nature of working together. The most

important aspect is the research, research base and the quantity of clinical data added everyday. This tradition continues even now.” Indeed it is a great message from Dr. Charles. I am sure, every medical institution in the country should imbibe this culture that comes out of research tradition, leading to the results of the research reaching the people in the form of medicare, medicines or vaccines. I recall, in India one of the leading institutions in Hyderabad L.V. Prasad Eye Institute has set a tradition of providing quality eye care particularly with social commitment of 1:1. 1:1 implies one free eye care service for every paid eye care service provided by the Institute. Also, they have a tradition of excellent research in ophthalmology and they are spreading the mission to various parts of the country particularly their research in stem cell which has led to the restoration of eyesight to 300 patients with burn-affected eyes.

I realize the research to realization of approved medical products takes nearly 7 to 10 years. That means: when India in a year invents say thousands of molecules, at least 10 to 20 should graduate into an approved medical product. But if it is realized within the country it will be very cost-effective and also internal wealth generator. Recently, I have visited a number of public and private sector medical and pharmaceutical R&D centres. In every laboratory I was very happy to see a large number of scientists working in the frontier areas of pharma sector, particularly in the private sector which provides them strengths to become globally competitive. Our R&D institutions should take up development of vaccines for malaria, anti-vaccine for HIV, a robust drug for TB and other water-borne diseases on highest priority. The great tradition India nurtured over many centuries must emerge again and multiple health research centres must flourish.

Every country has a specific combination of sanitary conditions, nutrition, lifestyle, disease pattern and possible solutions. Naturally, the research has to be nation-specific and also in certain cases region-specific so that we can provide an integrated solution to the prevention or cure of a particular disease. In this connection I would like to talk to you about a strategy adopted in a beautiful hill region in India which I am fully familiar with.

On 19th October 2002, I participated in the launching of a Mobile Clinic and Research Centre in Uttaranchal. This effort was piloted by the Technology Information, Forecasting and Assessment Council [TIFAC], the Government of Uttaranchal, Birla Institute of Scientific Research and many other agencies. After three years of its operation, I found this mobile clinic has been used in six districts of Uttaranchal and treated nearly 45,000 patients during this period. Among the patients treated, 48% belong to the below poverty line category. They have taken 10,000 ultra sound, 5,600 X-rays, 1800 ECGs and nearly 21,000 lab tests. The mobile clinic has documented the disease profile of the patients in the region (six districts) which falls into the following categories: acute peptic ulcer, anaemia, anti-natal, chronic obstructive pulmonary diseases, hyper tension, pelvic inflammation, renal calculi, upper respiratory tract infection and worm infection. This type of analysis has been possible because of computerized system of clinic management introduced right in the beginning. Also, the mobile clinic has been used in regions which are normally inaccessible and where organized medical facility is not available. This, I consider as the best form of reaching the health care to the neediest people in the country. This is a low cost solution with committed health care personnel and institutions. I would recommend to CMC Vellore to have a mobile clinic moving to different villages located around Vellore and conduct periodic medicare camps so that the number of patients coming as out patients will be substantially reduced. The clinical data provided by this model will be useful for the researchers in the medical college. Additionally mobile clinic data must be networked so that the integrated data from various hospitals can provide a definite direction for health care research. When I was in the J&K border at Tangdhar and Uri sector, I interacted with the patients in Uri and specialist doctors in Srinagar through the ISRO telemedicine network established in these places. A combination of mobile clinic and telemedicine facility can provide quality medicare to people living in remote areas. Now I would like to discuss about health status of our country (India) and specific measures needed for improving the health care status.

India has made considerable progress in its health status since its Independence and particularly during the last fifteen years. At

the time of Independence, the life expectancy of an Indian was less than thirty years. Between 1991-2005, the life expectancy of Indians has gone up from 58 to 64.35 years, infant mortality has come down from 87 to 60 deaths per 1000 live births and population growth rate has decreased from 1.9% to 1.4%. Still infant mortality is very high. We have to bring it to the level which has been achieved by Kerala that is 1.56%.

I would like to briefly talk to you on some of the diseases and actions proposed and future needs. Our experiences will definitely be shared with the third world developing nations in order to provide health care for all.

There is an effort to bring the entire country under the Revised National Tuberculosis Control Programme (RNTCP). So far, 93% of our country has been brought under this programme and by October, 2006 the entire country will become part of this programme. This will ensure that at least 75% of the total tuberculosis cases are detected every year and brought under direct surveillance. The treating agency must ensure that at least 80% success in fully curing the disease is achieved within the year. If this regime is followed continuously for over ten years our tuberculosis load will come down to less than ten per one lakh of population. For achieving this it is also essential to work faster on the development and clearance of new drugs which are in the pipeline.

Modern medicine has always relied on newer scientific inventions. Many of the world inventions have been used by Indian Health Care Systems effectively. India has also made significant contributions in developing drugs that are critically required for India. One of the achievements comes from a laboratory of the Council of Scientific and Industrial Research (CSIR). CSIR lab has developed a new therapeutic molecule for tuberculosis. This molecule has shown the potential to cure TB in around 2 months, as against the standard treatment of 6 to 8 months. This breakthrough is very important. After completing the pre-clinical studies, the molecule transformed into a drug called Sudo-terb is scheduled to undergo clinical trials in humans. This development has been done as a public-private partnership involving

the Lupin, the three CSIR Laboratories, namely, Central Drug Research Institute, Indian Institute of Chemical Technology and National Chemical Laboratory, and the University of Hyderabad. It is hoped that the drug will be in the market soon after the clinical trials. In addition to the above, there is also a need to develop a more effective vaccine against tuberculosis. The combined action of surveillance, detection and disciplined treatment have to work together to ensure faster cure of existing cases. Prevention of future cases has to be achieved through R & D efforts of developing new breed of vaccine and medicines. The collaborative action is needed between health care personnel, doctors, researchers and the pharmaceutical companies both in the private and public sectors to accomplish this mission.

Incidence of malaria has reduced from 22 lakh to 18 lakh in the period 1998-2003. However, the death cases have increased from 644 to 943. I understand that the conventional medicine used for treatment of malaria namely Chloroquin has become resistant to Falciparum which causes cerebral malaria. Our scientific community has developed and produced a drug named Arteether from Artemisinin which has been found to be an effective cure for cerebral malaria. I understand that this drug is being exported to over forty countries. Also, Ranbaxy has acquired a malarial drug molecule and they are progressing towards clinical trials. The fully developed drug will be available in the market soon. This will be another important milestone in the treatment of malaria.

Over the years I find that in spite of our efforts there is no rapid reduction in the occurrence of malaria cases in the country. While taking up new projects it is essential to have multi-faceted inter-sectoral collaboration between various partners so that the impact assessment of the project on new types of disease can be foreseen and suitable preventive action taken to contain the disease. In addition to this we have to improve the surveillance, develop rapid diagnostic kit and use the conventional prevention methods of spraying to control the vector. International Centre for Genetic Engineering and Biotechnology in collaboration with Bharat Biotech has developed a vaccine for malaria which will go for toxicity trials on animals. There is a need to speed up such projects so that they will benefit the entire community who are affected by malaria in different parts of the world.

It is reported that in India the number of HIV infected people is on the increase. It is critical that the transmission of HIV infection is prevented. An effective vaccine that can prevent this disease will be a cost-effective tool for control of infectious diseases. There are three sub-types of virus classified as A, B and C. I understand that Indian population is largely affected by sub-type C virus.

There are two candidate vaccines presently considered for use against sub-type C virus in our country. In view of the urgency of finding a cost-effective vaccine the expert group reviewed the vaccine candidate for HIV sub-type C in the pipeline. Adeno-Associated Virus (AAV)-based vaccine with HIV-1 sub-type C (African strain) developed by Targetted Genetics Corp, USA was found to be in advanced stage of test in different parts of the world. This HIV vaccine (tgAAC09) is now undergoing Phase-I trial for safety and immunogenicity assessment in healthy HIV uninfected volunteers at National AIDS Research Institute, Pune.

The Indian vaccine has been developed by scientists from National Institute of Cholera and Enteric Diseases in collaboration with National Aids Research Institute, Pune and Therion Biologics, USA. This is a recombinant vaccine containing six genes from HIV 1-C strain. This vaccine was developed from the virus isolated from National Aids Research Institute, Pune. This will go into Phase-I trial in healthy uninfected adults at Tuberculosis Research Centre, Chennai during this year. Both these programmes are being progressed as a joint venture between ICMR, National Aids Control Organisation (NACO) and International Aids Vaccine Initiative. In addition to these, two vaccines — a DNA based vaccine and an SFV vaccine — are also under development.

Time has now arrived to take up this development in a mission mode so that an effective vaccine will be available for our country within the next two years. Simultaneously, I would suggest that the medical community must start working on the development of anti-vaccines for sub-type A and B also.

The treatment for cancer is prolonged and expensive. A common man in the rural area may not be able to sustain the financial burden.

In that respect I am very happy to find that certain institutions like Karunya Nilayam in Kerala is providing free medicines, free noon meals and free accommodation to a large number of patients. This is a very important societal mission.

Karunya Nilayam has initiated a programme of screening of children in the rural areas and providing total treatment for over hundred cancer-affected children. Such societal missions must be carried out by a large number of charitable and philanthropic organisations apart from Government commitment to remove the suffering of the people from this dreaded disease. As a first step we can contain the spread of the disease through education, to know some of the causes needing lifestyle change and removal of environment hazards. As a second step citizens can be advised to report immediately to the doctor if they find anything disturbing in their routine or anatomy. This is where the periodic screening of all women between the age of 35 and 60 through mammogram and papsmear will help against breast and pelvic cancer. Advancement in cancer treatment has resulted in the development of precision radiation and tumor targeted therapies. Latest technique uses nanotechnology-based genetic transfer. The mobile clinic can also be used for screening the children in the school and the women in villages for early detection of cancer.

When I visited Chattisgarh, I was informed by various authorities that sickle cell anaemia disease is prevalent in certain tribal areas and even in the adjoining States. I understand over 25 lakh population suffers from this disease. Life expectancy of this population is low and it is reported that this disease is a silent killer.

Sickle cell disease is an inherited condition. Two genes for the sickle haemoglobin must be inherited from one's parents in order to get the disease. A person who receives a gene for sickle cell disease from one parent and a normal gene from the other has a condition called sickle cell trait. Sickle cell trait produces no symptoms or problems for most people. The severity of sickle cell disease varies tremendously. Some people with sickle cell disease lead lives that are nearly normal. Others are less fortunate, and can suffer from a variety of complications. Some of the common symptoms seen in the patients suffering from

sickle cell anaemia include (i) anaemia, (ii) intermittent jaundice, (iii) severe joint pains, and (iv) recurrent infections. These symptoms appear between the age of four and five, and severity increases with advancement of age. The available treatment strategies can be divided into anti-sickling agents, vaso-active drugs, bone marrow transplantation and gene therapy. Dr. Kmiec had shown that the new gene repair technology may hold promise as a treatment for sickle cell anaemia and other diseases by correcting the DNA mutation from which they arise. The medical researchers have to take up this task in all earnestness and find a comprehensive treatment for this disease. I am telling you because I am sure many of the graduates passing out from CMC may be taking assignments in various parts of the country where this disease is prevalent. CMC can take up leadership in research to treat and prevent the disease.

Multi-dimensional solutions are available for management of the diseases based on my discussion with experts. The solutions include medicinal treatment using statins, which lowers the cholesterol in the blood by reducing the production of cholesterol by the liver. Statins block the enzyme in the liver responsible for making excess cholesterol. However one has to be careful about the side effects and take adequate precautions while treating the patients. The second is through angiography and angioplasty using stents. Advancements in stents have resulted in the introduction of drug coated stents which hold a tremendous promise in the near perfect coronary artery disease. I understand that very soon we may have bio-degradable stents. The next generation stents may be nano-stents. If the heart blockage is severe, and we find valve defect and death of cells in the heart due to less blood supply etc. surgical intervention will be necessary or it may lead to treatment using stem cells.

We have all witnessed the treatment of cardiovascular disease moving from very invasive to less invasive methods. In the seventies bypass surgery was the big news, in the eighties it was balloon angioplasty and in the nineties it was the stent.

Now, moving a step further is a totally non-invasive treatment - External Counter Pulsation (ECP), a truly non-operative, non-pharmaceutical, safe and effective treatment which has made big news

in the west. ECP is FDA (USA) approved and finds reference in medical and cardiology textbooks. Many favourable articles have been published in the Journal of the American College of Cardiology, Cardiovascular Review Reports, Cardiology, Mayo Clinical Proc., Clinical Cardiology, Journal of Critical Illness, Journal of External Counter Pulsation, etc. In India, ECP is available at Sibia Medical Centre, Ludhiana besides Escort Heart Institute and Research Centre, New Delhi, Peoples General Hospital, Bhopal, Jamnagar and the International Centre for Cardio Thoracic and Vascular Diseases, Parumala. This is a ripe area of research for the doctors and scientists of CMC, Vellore.

Human disorders can be classified into three broad categories. They are genetic disorders, disorders due to cellular function deficiency, and disorders arising out of certain pathogens. I recommend intensive research for developing and producing cost-effective treatment regime for the above categories of disorder through

- (a) Gene therapy and gene chip research,
- (b) Stem cell research, and
- (c) Combination vaccine and pathogen-specific antibiotics.

This could lead to cost-effective and safe treatment for the needy and improve the quality of life of mankind on this planet. CMC can be the leader or partner in some of these research areas.

I would suggest to CMC to concentrate on the following areas of research.

- (a) A solution for treatment of mentally challenged children is not being looked at in an integrated way. CMC may like to carry out research on the application of stem cell for the treatment of mentally challenged children.
- (b) Research on finding why Indians wherever they are, are susceptible to cardiac diseases at an early age.
- (c) Research for effective treatment and prevention of sickle disease.

Recently, there was a meeting of cured patients, their doctors and a few social workers. One important point that emerged during the interaction was that the relationship between the patient and doctor extends to patient's family. This, in turn, transmits effective messages from one family to another family on advice to prevent diseases, necessity of periodic checks, the dietary habits and the need for life-style changes including exercise for good health. Actually, I believe this good contact between the doctor and patients is comparable to that of a teacher and student. I request every doctor of CMC to play the role of a teacher in advising every family on disease prevention and methods to lead a healthy life. I hope you will find time for this noble action.

The mission of offering the best available patient care, the most sophisticated education to physicians and patients and being the leader in medicare is indeed a very challenging task. This mission demands the highest of the human capabilities in intelligence, innovation and perseverance.

My best wishes to all the members of CMC Vellore in their mission of providing equitable health care to all the citizens of this region and developing quality health care human resource for the nation.

Traditional Medicine System for Removal of Human Misery

I AM INDEED delighted to inaugurate the Ayurveda Hospital Complex and to interact with the students. My greetings to the Principal, physicians, researchers, staff, health planners, students and all those associated with this Ayurveda Hospital for their excellent contribution in promoting the cause of integrated medicine for removal of human misery and pain.

This hospital, I understand, is contributing in the Ayurveda research and also medical care. Kerala has been a leader of Ayurveda system of medicine for centuries. The traditional eight branches of Ayurveda treat various types of diseases and provide personalized treatment to individuals. Ancient knowledge is a unique resource of India, for it has the treasure of a minimum of 5000 years of civilization. I am delighted to note that with the experience of a 139-bed hospital the institution is now expanding with an additional 350 beds.

The contributions made by Ayurveda Hospital in providing effective remedies for various kinds of ailments such as paralysis, piles, fistula, ulcers, discogenic diseases, degenerative diseases of central nervous system, allergic diseases, eye diseases, HIV/AIDS, TB and Cancer are indeed noteworthy. It is also important that the hospital and training college are integrated. I am sure the clinical data so far recorded will lead to good research in the field of discovering molecules leading to ayurvedic medicine. I would like to talk on the topic “Traditional Medicine: Our Strength”.

I would like to share my experiences that I had while I was in Anna University, Chennai. One of them resulted in getting a patent

for a new molecule discovered from a herb as an anti-cancer drug. This came out of the fusion of two great minds, one was a biotechnologist and the other was a traditional siddha medical practitioner. The traditional system of medicine like Ayurveda, Siddha etc. have advocated and practised preventive and curative medicinal recipes specific to individuals. The body, mind, food and environment were looked at holistically to suggest a preventive or curative approach to health. Medicinal plants offer enormous scope for development of drugs. We need to create database of traditional medicinal plants for specific bioactivity and lead for development of new drugs.

The convergence of bioscience and IT into bioinformatics has given the thrust to researchers for genomics-based drug discovery and development. Pressure is mounting on the pharmaceutical companies to reduce or at least control costs, and have a growing need for new informatics tools to help manage the influx of data from genomics, and turn that data into tomorrow's drugs.

Bioinformatics data play a vital role and are emerging as a business model for the medical and pharmaceutical sector. Key areas such as gene prediction, data mining, protein structure modelling and prediction, protein folding and stability, macromolecular assembly and modelling of complex biological systems are thriving and IT has a major role to play in these areas in bringing the tools to manage the high throughput experiments and the data they generate, and sharing and integrating all the data in a meaningful way resulting in the detailed models of complex systems, particularly biological pathways.

Our country is rich in human resources, particularly of scientists, doctors, technologists and engineers. The basic infrastructure is available for advanced research. The need of the hour is to network the existing facilities and expertise with commitment and conviction to augment and facilitate the pace of research and development. There are tremendous opportunities for technologists to work for an 'Integrated Health For All' in a mission mode which can be suitably evolved for implementation. I would suggest to Ayurveda Hospital to carry out collaborative research with other renowned Ayurvedic and Allopathic hospitals so that the diagnosis and treatment database will increase

and lead to sharing of knowledge and good medical practices. The combination of Ayurveda Hospital and the college should enable to establish the connectivity to the Ayurvedic research laboratories and drug manufacturers. This practice will reinforce good teaching. Good research is essential for good teaching.

On 19th October 2002, I participated in the launching of a Mobile Clinic and Research Centre in Uttaranchal. This effort was piloted by the Technology Information, Forecasting and Assessment Council [TIFAC], the Government of Uttaranchal, Birla Institute of Scientific Research and many other agencies. After three years of its operation, I found this mobile clinic has been used in six districts of Uttaranchal and treated nearly 45,000 patients during this period. Among the patients treated, 48% belong to the below poverty line category. They have taken 10,000 ultra sound, 5,600 X-rays, 1800 ECGs and nearly 21,000 lab tests. The mobile clinic has documented the disease profile of the patients in the region (six districts) which falls into the following categories: acute peptic ulcer, anaemia, anti-natal, chronic obstructive pulmonary diseases, hyper tension, pelvic inflammation, renal calculi, upper respiratory tract infection and worm infection. This type of analysis has been possible because of computerized system of clinic management introduced right in the beginning. Also, the mobile clinic has been used in regions which are normally inaccessible and where organized medical facility is not available. This, I consider as the best form of reaching the health care to the neediest people in the state. This is a low cost solution with committed health care personnel and institutions. I would recommend Ayurveda Hospital to have a mobile clinic moving to different villages located in Kerala, particularly hilly regions and conduct periodic medicare camps so that the number of patients coming as outpatients will substantially reduce. And research potential of the hospital will increase.

This Ayurveda Hospital with its college can take a mission to scientifically bring out a document on the diseases for which Ayurvedic treatment gave the cure. Based on this experience, even the syllabus in the Ayurveda College and the treatment can be configured. What is needed now in the country today is the evolution of treatment for

the disease like HIV and HIV-TB combination. If Ayurveda research and practice can give a solution, it is a great contribution to the world.

Since every one of you is involved in the noble profession of removing the pain of the people, you can also play a vital role in preventing ailments through proper health education to the patient as well as to his or her relatives and friends through lifestyle intervention. This can consist of a proper diet with low fat and high fibre, regular aerobic exercise like walking and stress management through Yoga, meditation and other methods. This can help in preventing the recurrence of the disease in the patient as well as promoting health awareness at all levels. When you remove the pains of the people, the patient becomes part and parcel of you and considers you almost as God. Hence, the patient will definitely accept your health education considering you as the most respected guru. Every patient receives his family members, relatives and friends when he is receiving health care in the hospital. That is the occasion where you can give this message of a healthy lifestyle to all of them.

I call upon the youth and Ayurvedic medical professionals assembled here to proceed confidently and chart your own course in achieving excellence in your chosen field. In the Western Ghats there is invaluable bio-diversity, which has been well documented. This region has been the cradle for Ayurveda and I wish you many more success in your endeavours. With these words, I inaugurate the 350 bed Ayurveda Hospital Complex.

My best wishes to all the students and Faculty Members in their mission of removing the pain of the people through traditional medical system which is India's civilizational heritage.

Rehabilitation through Modern Technology

I AM INDEED delighted to visit the Swami Vivekanand National Institute of Rehabilitation Training and Research (NIRTAR) in Cuttack and interact with you all. I realize that this complex has come out of the pioneering work of Dr. Balu Sankaran. My greetings to the team who have worked consistently for the last three decades to realize this complex and to provide the benefits of health care to patients with orthopaedic disabilities, hearing disabilities, congenital deformities and leprosy. I am happy that the institute has built up infrastructure for carrying out the rehabilitation surgeries, physiotherapy and occupational therapy units, workshop for fabricating orthotic and prosthetic aids and visual and psychological counselling. I would like to discuss on the topic “Technology can remove the pain”.

Rehabilitation process should aim at enabling persons to reach and maintain their optimal physical, sensory, intellectual, psychological and social functional level. It has to include measures to provide and restore functions to compensate for the loss or absence of a function. It should include from more basic and general rehabilitation to goal-oriented activities, for instance vocational rehabilitation.

Training is an important educational mechanism to remove the disabilities. We have recently come across one interview with a wrestler who is knee-less and hand-less. The training from childhood, will-power to be on his own and above all the willingness of benefactors with love and compassion to go all out to help such special persons, demonstrate that special abilities can be built.

Dr Stephen Hawking is one of the most accomplished physicists of our time. This great scholar was affected by motor neuron disease

which deteriorated so much that it threatened his research career. His speech became slurry and many people predicted that he will not live to complete his Ph D. His determination and the help that he received from modern technology made sure that he not only lived to complete his Ph.D but also made the most enviable contribution to Physics, the string theory. He is a great living example in radiating the confidence to win in the midst of multiple physical disabilities.

I have experienced that the composite product technologies helped the disabled to have light weight artificial limbs or FROs (Floor Reaction Orthosis) – Calipers at an affordable cost and at one tenth weight in composite material. After the development of FRO, many camps have been conducted for fitting FRO's including Chandipur, Balasore district. I could see the happiness of the recipients in these camps because of the lightness of the FRO. Now I would like to narrate my experience of visiting an FRO Camp at Belgaum for providing rehabilitation to polio affected and special children.

A seven year old boy Master Bhimappa, son of a labourer belonging to Belgaum District, Karnataka studying in primary school had lost both his lower limbs in a road accident. He wrote me a letter seeking help for rehabilitation. Then three of my friends Dr. A.S. Pillai, Dr. L. Narendranath, and Shri Mayank Diwedi, went into action.

Dr. Narendranath, Orthopaedic Surgeon, NIMS, Hyderabad examined the boy – diagnosed and prescribed bilateral above-knee prosthesis for him. Sthree Sakthi of Lions club of Belgaum came all out to help the boy by taking him to Hyderabad and treatment commenced on fitment and gait training. With this prosthesis fitment, Master Bhimappa walked confidently and was able to negotiate distances comfortably. Based on this experience Dr. Vijayalakshmi, Sthree Sakthi of Lions Club sought help for providing light weight calipers to many polio affected children of Belgaum region. Our team of doctors and engineers went into action. Lions Club organized camps to screen the children for fitment trial and over six hundred children were fitted with FROs on 15th October 2004. After this event a big camp was conducted in Loni on 15th October 2005 where thousand children have been rehabilitated. This shows the nobility of heart of all the

participants in this mission. I would suggest to the members of Swami Vivekanand National Institute of Rehabilitation Training and Research to conduct such FRO camps in the rural areas of Orissa.

I am confident that the NGOs and Government functionaries in other areas of the country can follow this model for providing relief and rehabilitation to the differently-abled children and bring smiles on their faces.

I visited Tanzania and South Africa during September 2004. My programme included a visit to Uhuru Primary School in Dar-Es-Salaam, capital of Tanzania where inclusive training is provided to physically challenged children along with other students. Uhuru Primary School set up in 1921 also admits children with multiple disabilities along with other children. This I consider a great social cause.

Prior to our visit to Tanzania, Smt Meira Kumar, Minister for Social Justice and Empowerment had sent a team of doctors and experts with appropriate systems like wheel chairs, hearing aids, prosthetic kits, headphones and Braille slates to Dar-Es-Salaam. Nearly 500 Tanzanian children were provided the assistive devices like hearing aid, tricycles, folding canes and Braille slates. Our team also trained them for using these devices in their day-to-day activities.

When I reached the school on 13th September 2004, it was a moving sight to see physically and visually challenged children trying to keep in tune with their school mates. A band was at hand playing rhythmic tunes on which the children were singing and dancing to celebrate the arrival of the ability. I realize whether in India or anywhere, the abilities provided in an environment of happiness and thankfulness engulfed everyone. Now I would like to discuss about hearing impairment.

Regarding the profound hearing disability, treatment is undertaken only in very few medical institutions since it needs a special device called cochlear implant. When the child doesn't have the hearing capacity it leads to dumbness. Cochlear implant coupled with computer aided training helps the deaf and dumb individuals to regain near normal hearing/speaking capabilities. Basically it is bypassing the damaged inner ear portion by replacing its functions with an electronic

system having external mike, speech processing circuit, transmitter and a receiver. The receiver is implanted below the ear. The receiver has an electrode, which will be inserted into the cochlear portion of the ear. Speech processor processes the input audio signals and converts them into electrical signals in various channels. The transmitter transmits these signals to the implant's multi-channel electrode, which terminates in various points of the cochlear.

The latest cochlear implant technology, contour advance, recently introduced in India, is specifically designed to protect the small and delicate cochlea structures during surgery. This helps to preserve any residual hearing. Its curved shape also provides more focused stimulation of the hearing nerve for better quality outcomes. The further research in cochlear implant must lead to design and production of cochlear implants which will need minimum invasive procedures for fitment. There are certain groups working in different parts of the country on treatment for hearing impairment using cochlear implant and also the development of cost-effective cochlear implant in the country. I would suggest to Swami Vivekanand National Institute of Rehabilitation Training and Research to become a partner in this programme.

Some time back, the National Institute for Mentally Handicapped, Hyderabad, had conducted a sports meet for all the physically and mentally handicapped children at National Stadium Hyderabad. In one race, nine contestants, all physically or mentally disabled, assembled at the starting line for the 100 metre race. At the starting signal, they all started out, not exactly in a dash, but with a relish to run the race to the finish and win, i.e. all others except one little boy who stumbled on the asphalt, tumbled over a couple of times, and began to cry. The other eight heard the boy cry. They slowed down and looked back. Then they all turned around and went back ... every one of them. One girl with Down's syndrome bent down and kissed him and said, "This will make it better." Then all nine linked their arms together and walked together and finally reached the destination. Everyone in the stadium stood, and the cheering went on for several minutes. People who were there are still telling the story. Why? Because deep down we know this one thing: What matters in this life is more than winning for ourselves. What matters in this life is helping others win, even if it

means slowing down and changing our course. I would say that you do not have to slow down. Rather by helping difficult areas, the feedback will make you go faster. If you pass this on, we may be able to change our hearts as well as someone else's. "A candle loses nothing by lighting another candle".

My best wishes to Swami Vivekanand National Institute of Rehabilitation Training and Research for success in their mission of providing rehabilitation care to special people particularly in the rural areas. May God bless you.

Twin Challenges for Health Care Community

I AM INDEED delighted to participate in the inauguration of the Paediatric Oncology Department of the Mahavir Cancer Sansthan, Patna. I greet the organizers, distinguished doctors, guests and dedicated nursing and paramedical staff on this important occasion. I appreciate the missionary spirit and dedication of the institute team in providing high quality and compassionate medical services and care to all sections of our society. I would like to talk on the topic “Removing the pain of the children”.

I would like to share a few experiences of people and their pain and possible solutions. Last year, I was at the Centre for Cellular & Molecular Biology at Hyderabad. I met hundreds of young scientists working on the genetic origin and manifestations of diseases, particularly cancer. The young scholars very enthusiastically shared with me their knowledge of molecular biology and cellular research. They told me about the information encrypted on the DNA in the cell nucleus and how both problems and solutions to the human lives reside on the software that nature has embedded in each life it creates.

Cancer, unlike many other diseases that come from the external factors, like infections, lifestyles and other environmental and physiological stressors, primarily emanates from within the cell. The life software embedded in the DNA material gets mutated and starts growing in a way that is not in line with the surrounding cells. Many times when immune systems are impaired, life turns against itself. The tragedy becomes unfathomable when it happens at an early age.

The intensified research in the area of DNA coding definitely will be able to provide the diagnostic and treatment solutions.

Some time back, I met one gentleman whose 6-year-old grandchild was on periodic blood transfusion for Thalassemia. The permanent solution, doctors told me, was a bone marrow transplant. The bone marrow of the child was not matching even between siblings and the parents. Unmatched bone marrow transplant is not done in India, I was told, and even in the West it is undertaken only in experimental situations. I met the child who was unaware of the time bomb that was ticking inside him. I prayed for him, for that was the only thing I could do. What can we do to strengthen the doctors' capabilities in such a situation? I think research on stem cell and its application towards cancer treatment holds great promise. May be clinicians getting involved in this research will lead to a breakthrough.

Treatment of cancer is very often multi-pronged involving unique combinations of radiation, chemotherapy and surgery. Genetic diagnosis can help to take good decisions while charting the course of therapy. On the drug side, instead of looking for agents that kill dividing cells, researchers are now looking for agents that encourage cells to get destroyed. Inside a growing tumor, the blood supply can be made to run short suffocating the deformed cells. Many drugs, called angiogenic agents, are now being used. However most of these drugs are imported and are very expensive. Industry-hospital-research institution consortia need to be established to develop and produce the affordable indigenous products.

Chemotherapy is often hazardous. It ends up destroying healthy cells in the vicinity and in the metabolic path of the targeted cancerous ones. A firm in Pune has developed algorithms describing interaction between normal cells, malignant cells and nutrients. The algorithms also take into account the Pharma-co-kinetics of the drug. Together with inputs on patient's age, height and weight and the type and volume of the tumor, the mathematical model can design an optimal drug schedule, minimizing the side effects. The type and volume of tumor can be automatically deduced by a combination of imaging and laboratory investigations. Positron Emission Tomography (PET) scans

offer powerful techniques in this area. This is a good example of how advances in many disciplines of science such as biomedical engineering, image processing, control systems, mathematical modelling and pharmacology are helping in the development of better and effective treatment for cancer patients.

Recently, while I was in Kerala, I inaugurated a project called Karunya Nilayam. As a part of this project children in the rural areas are being screened and provided total treatment for cancer. Since Mahavir Cancer Sansthan is starting a Paediatric Oncology Department, I would suggest to the Sansthan to nominate a team of doctors to visit village schools and screen the children. This will enable early detection of cancer. The detected cases can be brought to the hospital for treatment. This will be a very important dimension for treating the needy children of Bihar.

Unlike adults the childhood cases of cancer are successfully treatable, as the types of cancers occurring in childhood are more responsive to chemotherapy and radiotherapy. However, the success depends on the availability of adequate nutrition to the child. Nutritional support should become part of therapy especially in rural areas. This will decrease complications, improve immunological status and improve survival. It is important that nutrition support is tailored to meet the needs of the individual child.

There are a number of hospitals providing paediatric cancer treatment in different cities of the country. It will be useful to network these cancer treatment centres enabling exchange of experiences among specialists leading to the delivery of best possible treatment to Bihar children. This type of interaction will also generate confidence among medical community to undertake treatment of complex cancer cases. During one of my visits I found that cancer centres have immunologists, physiologists and psychologists working together. This model could also be followed by Mahavir Cancer Sansthan to provide psychological support to the children facilitating faster recovery.

Creation of Paediatric Cancer Centre at Mahavir Cancer Sansthan having 50 exclusive beds for children is a significant step forward in

dealing with the most challenging health care problem of this region particularly of children. However, it is essential to have connectivity of general practitioners with this centre to make a major impact in terms of reaching the needy as well as helping them out. The mission of offering the best available patient care, the most sophisticated education to physicians and patients and being the leader in the cancer research is indeed a very challenging task. This mission demands the highest of the human capabilities in intelligence, innovation and perseverance. Above all a mind to serve the needy is important.

Let our new generation have good health and prosperity and not succumb to the needless waste of human life. Cancer prevention and cancer cure are indeed the twin challenges to the medico and health care community. Challenge transforms into mission of pain removal and thereby provides useful life that is close to God.

With these words, I inaugurate the Paediatric Oncology Department of Mahavir Cancer Sansthan. My best wishes to the doctors and other members of this Sansthan for success in their mission of providing quality health care to the Bihar children.

4

Education, Art and Culture

Knowledge – Prime Mover of Prosperity

I AM INDEED delighted to inaugurate the International Conference on Digital Libraries (ICDL) 2004 organized by the Department of Culture in partnership with The Energy and Resources Institute (TERI). My greetings to the organizers, all stake holders in the digitization and the knowledge business, library and information science professionals, e-learning community and the participants of the conference. I am happy to see that there are many distinguished technologists and library professionals gathered here from all over the world. You have all made significant contributions to create Digital Libraries in your own country and in your own sphere of expertise. We have many initiatives in India including the Digital Library of India Portal. I would request all of you to evolve methodologies to share all our Digital Contents with no barriers. This will truly speak of the technology as an integrator of people. I urge all of you to pledge that we will share information of value freely with those citizens in the less privileged nations across the world. I would like to talk to this audience on “Digital Library and its Multidimensions”.

Knowledge has always been the prime mover for prosperity. A knowledge society is one of the basic foundations for the development of any nation. Knowledge has many forms and it is available at many places. The acquisition of knowledge has therefore been the thrust area throughout the world and sharing the experience of knowledge is a unique culture of our country. Digital Library is a new instrument, which can spread the knowledge nearly at the speed of light. India is a nation endowed with natural and competitive advantages as also certain distinctive competencies. But these are scattered in isolated pockets and the awareness on these is inadequate. During the last few centuries the world has undergone a change from agriculture society,

Speech while Inaugurating the International Conference on Digital Libraries-2004,
New Delhi, 24 February 2004

where natural labour was the critical factor, to industrial society where the management of technology, capital and labour provided the competitive advantage. In the 21st century, a new society is emerging where knowledge is the primary production resource instead of capital and labour. Efficient utilisation of existing knowledge can create comprehensive wealth for the nation in the form of better health, education, infrastructure etc. for improving the quality of life. Ability to create and maintain the knowledge infrastructure, develop knowledge workers and enhance their productivity through creation, growth and use of new knowledge will be the key factors in deciding the prosperity of this Knowledge Society. Whether a nation has emerged as a knowledge society or not is judged by the way the country effectively deals with knowledge creation and knowledge deployment.

I was studying different dimensions of knowledge society, and how would it be different from the industrial economy. In the knowledge economy the objective of a society changes from fulfilling the basic needs of all round development to empowerment. The education system instead of going by text book teaching will be promoted by creative, interactive self learning – formal and informal with focus on values, merit and quality. The workers instead of being skilled or semi-skilled will be knowledgeable, self-empowered and flexibly skilled. The type of work instead of being structured and hardware driven will be less structured and software driven. Management style will emphasize more on delegation rather than giving command. Impact on environment and ecology will be strikingly less compared to industrial economy. Finally, the economy will be knowledge driven and not industry driven.

Knowledge Society has two very important components driven by societal transformation and wealth generation. The societal transformation is on education, health care, agriculture and governance. These will lead to employment generation, high productivity and rural prosperity. How do we do that?

The wealth generation is a very important task for the nation, which has to be woven around national competencies such as information technology, bio-technology, space technology, weather forecasting, disaster management, tele-medicine and tele-education,

technologies to produce native knowledge products, service sector and infotainment. These technologies and management structures have to work together to generate knowledge society.

Evolution of policy and administrative procedures, changes in regulatory methods, identification of partners and most importantly creation of young and dynamic leaders are the components to be in place. In order to generate wealth, which is the second component for establishing a knowledge society, it is essential that simultaneously a citizen-centric approach to evolution of business policy, user-driven technology generation and intensified industry-lab-academy linkages have also to be established in every country.

The systematic process of finding, selecting, organizing, distilling and presenting information improves an employee's comprehension in a specific area of interest. Knowledge management helps an organization to gain insight and understanding from its own experience. Specific knowledge management activities help focus the organization on acquiring, storing and utilizing knowledge for problem solving, dynamic learning, strategic planning and decision making. It also prevents intellectual assets from decay, adds to firm intelligence and provides increased flexibility.

Knowledge creation has two dimensions, one is explicit knowledge and the other one is implicit knowledge. The explicit knowledge comes from published books, written materials, proceedings, presentations etc., whereas the implicit knowledge is derived through the systematic observation and capturing of data from the tacit knowledge available among the individuals in the organization, through their approach to problem solving, bottle-neck removal, goals setting, interactions etc. We need a systematic mechanism to capture this knowledge to make the organization a truly learning organization which makes use of existing knowledge judiciously and efficiently.

Digital library is an important component for capturing the explicit knowledge. This has to be supplemented with the implicit knowledge to the digital library system, which will eventually get transformed into a knowledge management system. Let us study how the digital library influences knowledge management in India through

research, design and development. This may be relevant to other countries also.

There is a mission of digital library web portal to create a portal for digital library of India piloted by the Ministry of Information Technology (MIT) with IISc and Carnegie Mellon University as partners for fostering creativity and free access to all human knowledge. This digital library as a first step will create a free-to-read searchable collection of one million books by 2005 in India. This library was launched in 2003. Prof. N. Balakrishnan, Chief Coordinator of Digital Library of India informs me that so far 20 centres are operational throughout the country, and over 50,000 books have been digitized of which nearly 30,000 are in 9 Indian languages. In the library of Rashtrapati Bhavan, which is part of the Digital Library of India, we have so far digitized over one million pages and also we are digitizing our old official records leading to e-governance implementation. The data will be available for use by different institutions in the country and abroad, depending upon their needs. The programme is progressing in the right direction, but it needs an impetus to meet the targets of 2005.

When I visited Bulgaria, we had an opportunity to present the work on Digital Library of India. The Indology department at the Sofia University which is doing seminal work expressed a keen interest in our Indian language books which number over 30,000 currently. In a recent follow-up visit, I understand that our Minister for Communication and Information Technology, Dr. Arun Shourie has presented them with a CD giving the titles and contents pages of all the books that we currently have in our Digital Library Portal and had requested them to select the books that they needed so that the copies of those books in digital form could be made on a few 250 giga bytes disks attached to a personal computer and given to them. This small PC with two disks can hold more than 20,000 books—what is needed for a reasonably sized library. This sets the trend towards making personalized and affordable Digital Libraries for specialized use, which form a sub-set of the main Digital Library of India.

I would like to share with you my thoughts on my home library. Wherever I turn in any direction, all the selected books in my library invite and tempt me to read. They are my friends. Digital library has to be user friendly and should give equitable access to explicit information, irrespective of place, educational or economic status. Digital Library of India will unite the institutions and the people. Digital library is where the past meets the present and creates a future.

I understand that the participating organizations in this mission of the Digital Library of India are storing the information locally and are also sending them to the Central Servers. What we need at this time is also concurrent measures to make very useful and highly user-friendly interfaces. This will make the Digital Library a friend of every one and its utility would enhance manifold. The organizers of this conference have given me the details of many initiatives for digitization across the country and abroad. These should be integrated so that there is inter-operability across the Digital Libraries Initiatives.

The future Digital Libraries would have speech interface so that the user could interact with the information and will be language independent. Though this technology world over is progressing, still many more things have to be done. I would urge the learned audience to work in close collaboration to ensure introduction of Natural Interfaces to the Digital Libraries world over.

Digital Libraries are not the Digital Equivalents of the present-day library. They would include, besides the books, manuscripts and journals, information and our heritage in all other forms including speech, folk songs, paintings and carvings. It is important that we take on this mission of integrating all forms of knowledge and culture into our Digital Library.

India has rich information relating to literature, music, traditional system of medicine and science embedded in palm leaves. It is necessary to search, understand and preserve this valuable information. Merely scanning the palm leaves would not be very useful. The number of people who can read the palm leaves and interpret the meanings, identify the plants and stones mentioned in the palm leaves is dwindling. Even

those few who can read, cannot write very well, that too may not be fluent in entering into the computer in Digital Forms. The Optical Character Recognition of these ancient scripts is also a very tough problem, almost intractable technically. I suggest that for every palm leaf scanned, we record in audio the information read by the experts. We can then put these on the web and invite other experts to provide free and fair commentary and validate every palm leaf data. This data can also be used for creating a new generation of palm leaf reading experts - a species that has almost vanished.

The digitization initiative has picked up momentum in the country; this is the time we have to make consistent national policies and procedures, which will lead to effective management and control of the data leading to enhancement of national knowledge base like what we have done in IT. Policy makers should take into account the standardization requirements, inter-operability, copyright issues, classification of documents and selection and use of the number of library information systems available with various organizations in the country in different standards. I would recommend deliberation of this issue in the conference and constitution of a multi-disciplinary task force for working out the draft policy document for implementation. The policy should take into account the dynamics of the web services technology and keep provision for on-line improvement and variation in future digital library systems. The task force should have access to all available resources so that they can ensure prevention of duplication of efforts.

We have to create a Knowledge Management Grid with the Central Digital Library Data Centre equipped with the comprehensive Virtual Digital Library and Knowledge Management System to which all the participating organizations are connected with broadband along with Internet connectivity. When we are in the process of digitizing millions of books we have to plan for the infrastructure and storage requirements across the country with disaster recovery facility.

Connectivity is strength, connectivity is wealth, and connectivity is progress. For enabling knowledge connectivity in our rural areas, we need to have a comprehensive plan for developing new infrastructure

for extending the digital library services in regional languages. These include development of OCR (Optical Character Recognition) Software in all the Indian languages, language independent operating system, database servers, search engines, web servers and messaging servers. This will enable the digital library initiative to percolate to the rural masses in the form of e-governance, tele-education and tele-medicine. This has to be done in a mission mode with the active participation of government, educational institutions, R&D organizations along with private sector enterprises. Here lies the challenge. It is a fertile research ground for all participants and educational institutions – a large number of doctorates can be produced in this area alone to push the frontiers of knowledge in Language Independent Digital Library (LIDL) and the language independent infrastructure software initiatives.

School children have been experiencing difficulty in getting textbooks in time, especially for the primary and secondary classes. It will be useful to digitize and store the textbooks in the library, which can be accessed by the students whenever required. This additional facility will enable easy availability of books to the students for instant reference and study through Internet and intranet access. In India, we have the greatest wealth of publicly funded books for schools and colleges. For example the National Book Trust of India and NCERT have many books in almost all the Indian languages. If we bring these to the Digital Library with periodical updating it will enable effective implementation of Right to Education Bill for our Children. This can be an outsourced service for the educational institutions.

We need to integrate the tele-education system with the Digital Library, so that the students can read and refer to the books suggested by the teacher from a distant location through on-line e-learning services.

There are large numbers of files and records occupying valuable space in our State and Central Government offices. It is essential to segregate the important files which have to be preserved for a long duration. These segregated files have to be digitized and stored in the digital library. This will enable easy search, faster location of the data and also release huge space occupied by physical cupboards in

our offices. In addition to this, the present data must be digitized and used in the workflow within the e-governance implementation. For this task, proper encryption system must be in place.

Land records have to be digitized and verified with satellite imagery and stored, which needs to be linked with e-governance applications for issue, transfer, conversions and additions and deletions. It should be linked with the revenue collection, estate management, and municipal records. Digitization and information flow has to go parallel to get the real advantage of e-governance workflow in the land records and its management domain.

For India, the preparation of reliable voters' list and its maintenance is an important governance activity. Digital data of a voter should be made available on-line over the Internet for all the States and Union Territories as a digital book for reference. Each State should have a dedicated site for presentation of the data accessible to all voters as well as election officers for verification. We should collect the voters' list through various mechanisms such as palm tops, desktops connected to Internet on-line with the biometric authentication and photographs of the voters. This is to be stored in a central data centre in each State which is connected to the national main data centre to enable issue of a single and unique code for each voter. It should be dynamically updated based on the movement of people wherever they go. We need to link the data of Registrar General and Census Commissioner with the voter's data bank, which will proactively provide the data of new entrants into the voters' list and delete data of the persons after life seizure. May this effort be the forerunner for multipurpose National ID Card. The Copyright Act was evolved when the rate of generation of new books and journals was low and it prescribed the protection period as fifty years in India. Similar are the time limits in other countries. In this millennium when the rate of flow of new books/journals has increased substantially, there is a need to have a re-look at the lock-in period of copyright documents. This International Conference could initiate action for reducing the copyright duration substantially.

Digital Library is a national mission. We should see that all the

schools, colleges, and universities digitize their libraries in their own native languages and connect to the outside world within the next four years. We have to ensure availability of fibre optic cables, satellite communication and wireless infrastructure especially in remote areas. It is also essential to realize high bandwidth technology like Multiple 10 Giga Bits connectivity across the country. Above all, just like I see in my library the book titles attracting me, I would like the first page of the Digital Library on my Laptop to have SDI (Selective Dissemination of Information) profile of individuals or schools/colleges.

May you be a master authority who can make use of the cumulative knowledge of the society through the digital library. May the proceedings of this International Conference on Digital Libraries 2004, reinforce our efforts in transforming nations into knowledge societies leading to their faster development and growth.

Creative Art Ignites the Minds

I AM INDEED delighted to participate in the Golden Jubilee celebrations of the Lalit Kala Akademi. My greetings to the Chairman and members of the Akademi, creative artists and distinguished guests. I understand that the Lalit Kala Akademi has made a remarkable contribution in nurturing creative talents in classical art, contemporary art and folk and tribal art hidden in different parts of the country. Lalit Kala artists, many of you have beautiful minds. Beautiful minds are the source of creativity. Creativity generates happy, divine paintings, sculptures. The world art community has known many artists. Shri Ram Kumar, Shri S.H. Raza, Shri Amarnath Saigal, Sculptor, Shri MF Hussain, and Chintamani Kar, Graphics Artist, and many are well known artists.

Creativity is present in many minds located in various parts of the country. Providing an opportunity to express their creative thoughts and the appreciation of the thought by enlightened persons is a means to promote higher level of creativity among the artists. This aspect has been done very successfully by Lalit Kala Akademi through national exhibitions, triennale India and circulating exhibition

I understand, recently an exhibition was exclusively done for the north-eastern region where hundred selected artists of the region participated with their art products. All these products were unique and attracted the attention of art lovers. Such exhibition should not only enable promotion of the creativity of the individual but also result in establishment of an enterprise in the region, which can act as a wealth generator for the state. Lalit Kala Akademi can promote launching of such enterprises in various regions and facilitate the artists to become contributors. This approach will enable preservation of the traditional

art, promote further creativity and also become a revenue generator for the artists and the state. During my visit to villages in Nagaland and Arunachal Pradesh, I realized that every home in the villages was standing as a symbol of folk art and culture.

In Rashtrapati Bhavan we conducted a painting competition for special children belonging to four different organisations. The children were brought to the Mughal Garden and asked to draw their visualization of the Rashtrapati Bhavan being in that environment. All the 200 children who participated in that exhibition drew wonderful paintings depicting the perception. Some of the paintings were exceptional. Many of the children who participated came from slum areas of Delhi. A jury selected three best paintings. I was very happy to commend the young artists. The jury mentioned that the children were extremely talented and they can excel if they are provided a right ambience and training. Some of these paintings we used in our new year greetings card. We have also created an art gallery where all the paintings received by me from children from all over India are displayed as exhibits. Creativity is in action there. This gallery is visited by all the children coming to Rashtrapati Bhavan and acts as creative aid for the children. Also we have beautiful artistic sculptures in marbles and other materials in Rashtrapati Bhavan. We don't have the details of the sculptors, when it was made and what is the theme of the sculpture. The artistic community may like to study and give their thoughts.

I would like to recall my visit to the National Museum of History and Art gallery in Sofia the capital city of Bulgaria in October last. National Museum of History is one of the largest history museums on the Balkans with 5,33,000 objects and largest archaeological and historical archive. It contains material remains from ancient and mediaeval cultures in the Bulgarian lands. I was amazed to see the implements and products which had been used before 5000 B.C. They buried their kith and kin with gold and silver. I also saw various forms of art and sculpture. It reminded me of our civilizational heritage and made me realize the scientific and cultural similarities, which unites the humanity.

I was impressed and inspired when I visited the National Art Gallery in Bulgaria. There I saw an exhibition of paintings, mostly done by Bulgarian painters. I also saw 100th birth anniversary exposition of the famous Bulgarian painter Zlatyu Boyadzhiev. Hundreds of paintings were done by him using his right hand as done normally. I was told that his right hand subsequently was paralyzed. But the indomitable spirit in him made him to paint using his left hand and these beautiful paintings were also displayed to reveal the excellence. That made me realize that constructive genius cannot be hampered by a physical defect, as the power comes from inside to make one to go ahead with the mission of his life. I received this powerful message from the paintings of Zlatyu Boyadzhiev.

When we look at our civilizational heritage, it is an integrated history of culture, peoples' way of living in various parts of the country and the evolution of an integrated Indian society. Since I am in the midst of a powerful creative audience I would like to share a thought with you. This thought I got, after visiting the Ajanta and Ellora caves, Mahabalipuram Pallava sculpture and many of our ancient temples which have preserved the very important sculptures and paintings without the names of the source and the date on which it was created. The history of some of our civilizational heritage, paintings and sculpture which are misplaced are to be recreated. I would suggest that the Department of Culture and many art lovers can take up the mission of creating a Heritage Cave in the hill region in the backdrop of mountains. In this cave, 5000 years of our cultural heritage, paintings and sculpture should be recreated with the knowledge base available in literature and with cultural historians. It could be a mission for the decade. All our best paintings and sculpture of today and tomorrow must also find a place in this cave. This Heritage Cave should be the place where the past meets the present and creates the future.

I was asking myself why theft takes place, particularly of idols, images, paintings from our ancient temples. How can we stop this? We need to find a solution.

In India digital library programme has made substantial progress under the aegis of MCIT along with IISc. Many of our paintings and

sculptures, which are getting damaged, should be captured in the digital form and preserved in multi-media. This will ensure preservation of cultural heritage of our nation. The advancement of Nano science has brought out a special Nano powder for restoration of old paintings and also application for preserving the new paintings, which are made today. This technology can be spread among our painters, sculptors and heritage managers.

Lalit Kala Akademi can search the talents available in remote areas of the country. They can have a special programme to attract differently abled creative persons to participate in art competitions for enabling them to recognize and nurture the talents through special training programmes and creating a forum for the artists to meet elevated minds for triggering their thoughts.

During the last 50 years Lalit Kala Akademi has done pioneering work in recognizing and promoting native talents in multiple areas of arts. I congratulate the Founders and the leaders who have contributed to the growth of the Akademi in that 50 years. I would suggest that the Akademi can have a vision of creating excellence in paintings and sculptures with simple audio and video commentaries to attract world wide interest.

Once again my greetings to all members of the Lalit Kala Akademi during the Golden Jubilee Year. My best wishes to all the members for success in their mission.

Art Elevates the Mind

I AM INDEED delighted to participate in the Inauguration of the Golden Jubilee Celebrations of the National Gallery of Modern Art, New Delhi. My greetings to the organizers, members of Ministry of Culture, the community of artists and art lovers, participants and distinguished guests. I note that the National Gallery of Modern Art represents the evolution of the changing art forms through the passage of the last one and a half century starting from about 1857. The foremost responsibility of the National Gallery of Modern Art is to ensure quality of its collection and to set and maintain a standard of excellence that pervades its activities such as development of galleries for permanent display, organize exhibition worldwide and preserving documents of modern art. Above all, it is essential that an exclusive area is allocated in the Art Gallery, for the young artists to present their work to the experienced artists and carry out research on modern art. There can be a series of lectures and tutorials by renowned artists organized periodically in this campus

On 16th September 2004, I happened to visit the Robben Island, in Atlantic Ocean, where I witnessed a sculpture synchronized with history. The Robben Island was the place where freedom fighters against apartheid were kept under imprisonment. I specifically went to see the cell where Dr. Nelson Mandela was imprisoned for 26 years. The first scene which I saw, when I entered Robben Island, was a sculpture bringing out the pain of imprisonment and the dream for the freedom from apartheid. Above all it reflected, not an individual being chained but the entire people who were fighting for the freedom were kept under confinement. This beautiful sculpture appeared to me throughout my visit of South Africa. This symbolizes how the fight against apartheid reached its peak and later culminated in freedom.

Speech at the Golden Jubilee Celebrations of the National Gallery of Modern Art, New Delhi, 8 November 2004

The sculpture is indeed a masterpiece integrating multiple feelings of imprisonment and an urge for freedom of a society. This unique sculpture work, a bronze block image, 'THE CAPTIVE' was the creation of Amarnath Sehgal in 1986.

Recently, I happened to study a book called "Articulations" – Voices from the contemporary Indian visual art. I was searching in the book about what is the unique quality of the great community of visual art and painting? What is their medium? What is the relationship and status of the society and the artists? Is there any connectivity between the medium of artists like ink and brush; and the society? While R.K. Lakshman loves painting crows for it stands out against any background, K.K. Hebber is inspired by rhythmic movement of lines. When M.F. Hussain says the paintings are the output of the society, it means: if the society is a mediocre society, you will get mediocre paintings, if the society is intellectual and prosperous, the paintings will reflect the situation. From these Articulations, definitely I realize that every painter and artist is a unique personality, in search of beauty out of every event which enriches him. I tend to agree with one of the artists, who says that the artists have to have "partnership with the known, unknown will express itself." This takes me to an event that took place recently.

Some time back I composed a poem in my mother tongue and translated it into English, titled "Life Tree". The message in the poem was celebration of life. While composing I never thought that the poem can be given life, beauty and creativity as I visualized. That is the time a young artist came and stayed with me in Rashtrapati Bhavan to paint the natural beauty of Rashtrapati Bhavan and the picturesque Mughal Gardens. He stayed with his family for two weeks and has created beautiful canvases bubbling with full of life. I can see in the paintings beauty of the flowers, smell the fragrance of the flowers, and taste the honey in the flowers and speaking to me with poems. When Manav came across my poem "Life Tree" he fell for it and he took seven days in the beautiful environment of the Mughal garden for transforming "Life Tree" into a speaking tree. What a beautiful creation? First time I realized painting and poem intertwined with the imagination of a painter which leads to the birth of a new creation.

That new creation touches your heart, smoothens your feeling and transmits beauty and peace of the combined art into every artistic person and showers happiness in his or her mind and soul.

Artists and scientists are heroes of the imagination or of the deep insight into the nature of things. A painter appears to completely visualize the picture with his imaginative skills and creativity before beginning to paint. This I can clearly see in the case of dancers also. This is what the painter Hebbler calls as the rhythmic movement. Now I realize that the lines are capable of singing and dancing, the paintings reveal that.

The paintings and sculptures bring out the creativity among children. To make the education process complete it is essential to include art as a subject in our educational curriculum. There are a number of arts and artistic expressions hidden in our ancient village culture which have not been brought to usage by the modern generation. It is necessary to carry out research and bring the natural artistic strength in different areas of the country, document them and bring them as curriculum to the students. This is how we will be able to hand down the civilizational heritage to our future generations. The art gallery can request leading artists to deliver weekly inspirational lectures in the gallery for motivating the children to develop a taste for modern art.

Art has also got technology in it. When the children start learning the art, they come to know about the usage of wood, earth, stone etc. and how they can be carved efficiently to give beautiful expression to the end products and preserve for generations. For example, for providing preservative qualities to the paintings and sculpture today one can use Nano powders. The Nano powder is used for the preservation and restoration of paintings, which has the properties like thermal insulation, anti-bacteria and high fade-resistance. The various technological options in creation, preservation and promotion should form part of the art education. Today with the digital technology being available restoration of paintings can be done without disrupting the usage of the art galleries. As Dr. Lochan would be aware, in the Rashtrapati Bhavan, the Kajar painting in the Ashoka Hall was temporarily replaced with a digital print of the original. The original

was placed back after a year duly restored. The Ashoka Hall continued to be used during this period for the visitors without any disruption. These phenomena can be made use of in many of the renovations which would be needed for keeping our heritage painting alive.

The art gallery is a mirror that shows a dimension of our proud heritage. It reflects our way of life, how our ancestors lived, what we cherish and often what we miss. Above all art gallery brings out the creativity of our artists for generations. The gallery reminds us how newer technologies have influenced our life, and dimensions of newer languages, newer expressions and newer way of life. They are reminders of where we came from. They give us a great pleasure by satisfying our inner urge to see what we are missing in this “modern world”. I understand that 90% of all the products that we use in our daily life would have been invented only in the last 100 years. Those that have been invented several centuries ago and had formed the most cherished invention of the mankind in those days became exhibits in galleries today.

When one enters the art gallery, a sense of inquisitiveness has to be created by the environment, which will make the visitor comfortable and feel great, enthusiastic and create a sense of pride about the Indian culture and its past. And also the art gallery should become a window of the best of artistic forms in the world. The exhibits must induce a process of understanding multifaceted dimensions of human personalities, the way in which the artist viewed his or her subject. The goodness of the art gallery must make the visitor to linger on the thoughts. It should ignite them and give them solace and peace in many directions. It should flow to others as well spreading serenity, peace and uplifting the atmosphere which will promote a feeling of divinity.

The visitor should be in a position to guide himself to the specific area of his interest, rather than being driven by the predefined path. Present – day technology can provide solution to this issue. Each and every gallery should be equipped with LCD displays and a multimedia presentation – giving the salient features of that gallery, cultural impact, historical facts behind exhibits – so that the message reaches the minds of the people and becomes a source of inspiration. The optimum mix

of Robotics, Artificial Intelligence, Virtual Reality etc. will provide dynamism and real time visualization.

We can even make it more interactive by customizing it in real time for any user who is willing to pay. For example, we can give the camera to a guide at the art gallery. The pictures will be relayed to a viewer's home through the Internet. Looking at the picture, the viewer will direct the Guide to go closer to some pictures or objects that he likes to see more or ask questions which the guide will answer. We need such innovative techniques to make our art galleries reach every one, just in time at any place. This way we can share our cultural values and heritage and make them an object of joy for every one.

I would like to share with you my experience after seeing the beautiful paintings of Raja Ravi Varma in Chennai Museum. It reflects the creativity of a genius. I can see many budding Ravi Varmas in the face of our children; I have got thousands of paintings from young artists, particularly from school children. Art is a great culture and it shows the creativity, inherent talents of the individual and his capability to visualize the scenario, nature and the future possibilities. I am just thinking, how to provide an opportunity for budding artists to imbibe the key characteristics of Raja Ravi Varma. Children get a unique opportunity by participating in competitions like Shankar's International Children's painting competition.

In India digital library programme has made substantial progress under the aegis of MCIT along with IISc. Many of our paintings and sculptures, which are getting damaged, should be captured in the digital form and preserved in multi-media. This will ensure preservation of cultural heritage of our nation.

I would suggest that the National Gallery of Modern Art may consider undertaking the following new projects as their Golden Jubilee missions.

- a. Creation of a virtual art gallery with a digital walk through for placement in the website so that people from different parts of the country can visit the galleries from homes or students and get inspired from the exhibits. The website can also provide data on all the exhibitions conducted by National Art Gallery both national and international.

- b. Create a data base of researchers who have used the National Art Gallery for carrying out research on different topics and the latest results of these researches.
- c. Convert the summer painting workshops of National Gallery of Modern Art to identify the young talents on different forms of art and introduce them to a noted master of painting so that the talent can be nurtured and allowed to blossom. NGMA can also consider granting some scholarship for providing financial assistance in deserving cases.
- d. Undertake a project on cost effective preservation and renovation of paintings including the application of Nano-technology as a means of preserving the future acquisitions of NGMA.
- e. Undertake a project for the process of digitizing all the acquisitions of NGMA progressively along with the researched data on the art and painting. In addition the data on the author, contemporaries of the art and the availability of similar paintings in other similar leading institutions in the world. This will enable bringing out a comprehensive document on NGMA for use by eminent artists and students.
- f. Conduct periodic seminars with new technology exposure to the young artists and also create a platform for the international art agencies, business experts to visit and see the inherent potential of our artists, which can pave the way for the export of these artistic items. This should be a continuous process.

I strongly believe that today's art gallery has a major role to play and should act as a cultural window to our country. It should provide a platform for innovation, creativity, and propagate cultural values, and promote research and development towards enriching our ancient technologies blended with modern techniques. It should graduate from the custodian of ancient culture into a platform for disseminating cultural values across the world.

I congratulate the art community on the occasion of the Golden Jubilee Celebrations and my best wishes to you all.

Succeeding Against Established Patterns

I AM INDEED delighted to interact with the students participating in the Children's Science Congress organised by the Indian Science Congress Association. My greetings to the student community and organizers of this science congress. I am happy that this event is integrating millions of children in the age group of 10 to 17 to interact in a common scientific platform. The topic I have chosen for discussion is "Innovative Minds".

According to the laws of aerodynamics the bumble bee should be unable to fly. Because of the size, weight, and shape of its body in relationship to the total wing span, flying is scientifically impossible. The bumble bee, being ignorant of scientific theory, keeps fluttering her wings. This high frequency vibration creates a vortex which enables it to fly. With determined efforts you can always succeed against established patterns.

The world is currently dominated by subsonic cruise missiles such as, Tomahawk, Harpoon and Exocet. However, with the advent of modern missile defence systems involving quick reaction missiles and lasers, the effectiveness of subsonic cruise missiles in penetrating the enemy defences has become limited. Hence, the need for faster missiles which can break the sound barrier. They are the supersonic missiles. India and Russia joined together as partners to develop a supersonic cruise missile by combining the technological capabilities of both countries accrued over the last few decades. India's Prithvi and Agni use advanced onboard computer and inertial navigation system. Russia recently developed an air breathing propulsion which can thrust the missile to supersonic speed. The scientific development of both

countries therefore became handy to jointly design and develop a new system. The result of this joint effort is BRAHMOS. BrahMos comes from the names of two rivers, Brahmaputra of India and Moscowa of Russia.

The BrahMos Missile has twin roles against sea and land-based targets and can be fitted on multiple platforms including ships, submarines, aircraft, mobile ground platforms and silos. The missile has a range of 300 km with 300 kg warhead. The cruise missile used in the Gulf War flies at a speed of 800 km/hr, like the speed of passenger jet aircraft. It is less than the speed of sound. BrahMos flies at a speed of more than three times the speed of jet, i.e. 3000 km/hr. Due to its supersonic speed the missile has definite advantage of shorter flight time to a target, before it could move away from the detected position. The reaction time available for the enemy to intercept or take preparatory steps to get away from the attack is drastically low. Due to the higher velocity of the supersonic missiles, the kinetic energy imparted on the target upon missile hit will be much higher thereby enabling higher level of damage to the target. BrahMos has nine times kill energy ($1/2 mV^2$) compared to the existing cruise missile.

The BrahMos missile is the first of its kind in the world and is a contribution of the Indian and Russian scientists. Nine flight tests have been carried out from land and sea against ship and land targets. All the flights are successful with repeatability in performance. This is a remarkable achievement for the scientific community and defence of our country.

I have a suggestion to all the children and management persons of the school. I have come across a wonderful and unique experiment by the school children of Uttaranchal. Mind you, they are from ordinary schools and most of them are studying in Hindi. The experiment involved use of mapping techniques to investigate and map basic socio-economic, environmental and ecological issues in the neighbourhood community. Armed with the scientific and technological tools such as Global Positioning System (GPS), Geographic Information System (GIS), Space Imagery incorporated in the hand held computers, the children

are creating maps with the neighbourhood details to improve their understanding of the immediate environment. These maps will enable further the technological community to find solutions for the regeneration of fast disappearing natural sources of water, improving road connectivity, finding better locations for electricity and water distribution points, reducing traffic congestion and improved systems of garbage collection.

I suggest all of you take up this neighbourhood mapping with a focus for next two or three years on identifying water bodies, polluted waters, ground water sources, wells, dried water pumps, flooded areas, small or big canals including dry ones, tanks, rivers etc. You will develop insights about the water linkages, I spoke about in the early part of my talk. Also you can identify water bodies for charging. Then the authorities, NGOs etc. will learn from you. It is a great mission for you.

Yesterday I read a news item where I find a 10 year old British school girl saved the lives of hundreds of people during the recent Tsunami episode on 26th December 2004 in Thailand by warning them a wall of water was about to strike, after learning about Tsunamis in her geography class taught by her teacher Mr. A. Kearney. She has been named ‘the angel of the beach’ by the top-selling tabloid *The Sun*.

Tilly was spending her holidays with her family on the Thai island of Phuket when she suddenly grasped what was taking place and alerted her mother. While she was on the beach she noticed that the tide was suddenly rushing out. As the other tourists watched in amazement, the water began to bubble and the boats on the horizon started to violently bob up and down. Tilly, who had studied tsunamis in a geography class just two weeks earlier, quickly realised they were in terrible danger. She told her mother they had to get off the beach immediately and warned there could be a tsunami.

She explained she had just completed a school project on the huge waves and said they were seeing the warning signs that a tsunami was minutes away.

Her parents alerted the other holidaymakers and staff at their hotel, which was quickly evacuated. The wave crashed a few minutes

later, but no one on the beach was killed or seriously injured. Tilly, from Surrey in England, gave the credit to her geography teacher, Andrew Kearney, at Oxshott's Danes Hill Prep School. She told that "Last term Mr Kearney taught us about earthquakes and how they can cause tsunamis.

"I was on the beach and the water started to go funny. There were bubbles and the tide went out all of a sudden.

"I recognised what was happening and had a feeling there was going to be a tsunami. I told mummy." Tilly's mother said she was "very proud" of her daughter, while her headteacher Robin Parfitt said she had "wisdom beyond her years". Mr Kearney said he remembered teaching Tilly and her fellow students that after the sea was sucked backwards, the next five to 10 minutes were crucial for people to survive. He said her quick-witted actions were typical.

Master Dhanvir Reddy and Master Chandan Prasad studying in 12th class science group of Bishop Cotton School, Bangalore have taken up the building and launching of a rocket designed and made by them in the school with the support of their parents, teachers and the school. These boys were interested in rockets right from the second class days. Both were friends since then and with common interest. The launch of GSLV in April 2001 triggered their imagination further and they wanted to build a rocket of their own. They carried out studies on the rocket for about three years using the school library and internet. Later, they prepared a design which they wanted to convert into hardware. They made the propellant through hand mixing and casting of dextrose and potassium nitrate in the ratio of 65:35. The diameter of the propellant was 2.3 inches and it was 2 feet long. This was placed in a 3 MM thick stainless steel 304 tube. The whole rocket motor is kept in a PVC pipe of 3 inches diameter and 1.6 metre long. The rocket is expected to go to a height of 3.8 kms and a range of 6.4 kms. Both the boys had visited the Satish Dhawan Space Centre, Sriharikota and have given their design and all details to ISRO authorities. They are awaiting their response for launching their rocket from the range. I thought of sharing with you this experience which will motivate many of you to take up such constructive hobby in your holidays as project work.

Recently, I met a group of students from South Korea accompanied by their exchange counterparts from Delhi Public School. I asked them what they understood of the Developed India mission. A small boy from the front row belonging to Delhi Public School replied through a small story. He said, once there was a big forest fire in a jungle. All animals and birds and living creatures were frantically trying to escape. However, one small bird rushed to the nearest waterhole and brought a beak full of water and dropped on the fire. Then the fire laughed and said what a foolish thing to do instead of escaping the wrath of the fire. However, the bird replied, see like me if we all the birds and animals bring in water to pour over you, the entire ocean will be here and you will be put off in no time. Therefore, it is important for every individual to do his bit for making India a prosperous and developed nation. I liked the spirit of this boy and I am sure if the 540 million youth of our country collectively work, India will be a developed nation much before 2020.

I met a great personality who was responsible for the freedom of South Africa. He is none other than Dr. Nelson Mandela. Particularly for the young people, you can learn two big lessons from this personality. They are indomitable spirit and virtue of forgiveness.

Cape Town is famous for its Table Mountain; it has got three peaks called Table Peak, Devil Peak, and Fake Peak. Between the peaks it was a beautiful sight throughout the day, sometimes dark clouds and sometimes white clouds embracing the peaks. Table Mountain is very close to the coast of the Atlantic Ocean. We travelled by helicopter to Robben Island from Cape Town in 10 minutes. It will take 30 minutes by powered boat to reach the Robben Island. When we reached the Island, except sea roaring, the whole island was silent symbolizing the thought: this is the place the freedom of individuals was chained. We were received at the Island by Mr. Ahmed Kathrada, a South African, who was a co-prisoner with Dr. Nelson Mandela. What surprised me was, in a tiny room sleeping and all human needs have to be fulfilled. It has to be remembered that Dr. Nelson Mandela, who was 6 feet tall was imprisoned in that room for 26 years fighting against the apartheid. The major part of his life was spent in this silent Island. He used to be taken for quarrying in

the nearby mountain for a few hours in bright sun. This is the time his sight got damaged. In spite of his body being tortured he revealed to the world his indomitable spirit. This is the time he evolved a manuscript of freedom in tiny letters every day, when the jail wardens went to sleep. This small tiny lettered manuscript finally became the famous book of Mandela “A Long Walk to Freedom”.

It was a great event for me to meet him in his house in Johannesburg. I would like to share with you, when I entered Dr. Nelson Mandela’s house, I saw his three dimensional form with cheerfulness: the mighty man who got the freedom for South Africa from the tyranny of apartheid. And also a person when he became the President of South Africa he gave the people freedom to move, freedom to live in South Africa to those people who specialized in apartheid and ill-treated and put him in the jail for 26 years. Dr. Nelson Mandela accepted them as equal citizens. I felt that I am touching the hand of a Mighty Soul. When he started walking he used to have a walking stick, he discarded the walking stick; I became his support walking stick. A big lesson that we learnt from this personality Dr. Nelson Mandela which is explained in one of the Thirukkural written 2200 years before.

இன்னா செய்தாரை ஒறுத்தல் அவர்நாண

நன்னயம் செய்து விடல்

which means, for those who do ill to you, the best punishment is to return good to them. Now I would like to administer 10 Point oath to you. Will you repeat?

Ten point oath for enlightened citizenship:

1. I will love whatever profession I take up and I will try to excel in it.
2. From now onwards I will teach at least ten persons who cannot read and write to read and write.
3. I will plant ten saplings/trees and ensure their growth.

4. I will go to rural and urban areas to reform at least five persons from the habits of addiction and gambling.
5. I will take responsibility for removing the pain of ailing persons.
6. I will participate in the mission of realizing the economic strength of India by combining it with an education with value system and by transforming religion into a spiritual force.
7. I will not support any differentiation on account of community or language.
8. I will lead an honest life free from all corruption and will set an example for others to adopt a transparent way of life.
9. I will always be a friend of the mentally and physically challenged and I will work hard to make them feel normal.
10. I will celebrate the success of my country and my people.

Challenges for the World Community

I AM INDEED delighted to participate in the interaction meet with the students, faculty and staff of Jawaharlal Nehru University (JNU), New Delhi. I greet the students and congratulate the faculty and staff members of JNU for shaping the young minds. I always cherish interaction with the students and faculties in the school and university environment. When I am with you, I would like to discuss with you “The evolution of enlightened citizen-centric society”.

There are many challenges in our planet earth of six billion people. There is shortage of water, increased atmospheric pollution leading to many diseases, depleting fossil materials and other natural resources, depletion of available land for agriculture and lack of availability of uniform opportunity to all citizens. Many nations are experiencing the problems of injected terrorism. The young people of the planet are dreaming to live in the land of opportunities and happiness. We have also seen that the economic prosperity of a few nations alone has not brought lasting peace to the world. No single nation will be able to handle the situation by itself. Humanity will require mega missions for harnessing solar energy, drinking water from sea water through desalination process and bringing minerals from other planets and also to bring space-manufactured products. In such a situation, the present reasons for conflict between nation and nation will become insignificant and unwarranted. India can play a major role in developing a new model of enlightened citizen-centric society which will provide prosperity, peace and happiness to all the nations in the world. Let me discuss the model.

The evolution of enlightened human beings is indeed a big challenge for the world community. There are three components to

that. The first component is education with value system, second is religions graduating into spiritual forces to bring universal brotherhood and the third is poverty eradication by attaining economic prosperity through a national vision.

The best part for a person is his or her learning period in the educational institution. The prime learning period is 5th to 17th year of age. Hence, the curriculum period is the best time for learning, and need the best environment and mission-oriented learning with value based educational system. The teacher who loves teaching is an important asset. This reminds me of the echo from Bestolozzy, a great teacher's saying, "Give me a child for seven years, afterwards, let the God or devil take the child, they cannot change the child." That is indeed the power of the teacher. For parents and teachers, educational campus and home have to have an integrated mission: education with value system. Fifteen-year value-based education of 30,000 hours in the educational campus is essential to establish an open and transparent society or a society with integrity. Up to the age of 17 years, the father, the mother and the teacher lead a child embedded with value-based education.

The nations will target development milestones in a dynamic environment instead of spending tremendous energy and time in problems initiated by small aims. This is the essential environment needed for transforming India into a developed nation.

Our nation is going through a major challenge of uplifting of 260 million people who are below the poverty line. They need habitat, they need food, they need health care, and they need education and employment and finally resulting in a good life. That means transforming into a Developed Nation. Our GDP is growing at more than 6% per annum, whereas, the economists suggest that to uplift the people below poverty line, our economy has to grow at the rate of 10% per annum consistently, for over a decade. How do we achieve this mission?

Integrated action: To meet the need of one billion people, we have identified five areas where India has core competence for integrated action:

- (1) Agriculture and food processing,

- (2) Education and Health care,
- (3) Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country,
- (4) Information and Communication Technology, and
- (5) Self reliance in Strategic sectors.

These five areas are closely inter-related and if well done would lead to national food and economic security, and national security. One of the important components of national development is PURA (Providing Urban Amenities in Rural Areas) which will eliminate the rural-urban divide. This model can be followed by the other nations also.

The Mission of PURA: The number of PURA units for the whole country is estimated to be 7000. This envisages integrated connectivities to bring prosperity to rural India. These are — physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through Internet kiosks; and knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes. These three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing of the products.

Each PURA cluster will connect about 20-30 villages depending upon the region and population and will cost about Rs.100 crores. This is a viable and sustainable business proposition. After initial short-term employment during construction etc., we have to plan for initiating actions for providing regular employment and self-employment opportunities in nationally competitive small enterprises in agro processing, manufacturing and services sectors for about 3000 people or more. If the industrial/business parks are marketed well, they can generate employment opportunities in support and services sector for about 10,000 people or more. This will provide sustainable economy for the rural sector. In this national mission, bankers can promote entrepreneurship in the rural areas. This will lead to the removal of

urban-rural divide. It will also help to ease out the growing slums in cities by making rural areas attractive habitats.

PURA as an Enterprise: A large number of banks have entrepreneurial development programmes. Banks have also been funding Small Scale Industries of different types in various regions. The small scale industrialist is a promising candidate for becoming the chief executive for managing the PURA complexes in an integrated way. PURA enterprises can also undertake management of schools, health care units, vocational training centres, chilling plants, silos and building a market, banking system and the regional business or industrial units. A new mission mode management style has to emerge for PURA enterprises. It should not be looking for protective legislations to support them. Rather they should be efficient to compete with others. This new PURA enterprise needs partnership from the bank, from the Government and also from the private entrepreneurs. Banks can train the entrepreneur for managing the PURA in their training centres and also provide them loans for creating and running PURAs as a business proposition. I would like to give a PURA model which is in operation at Vallam in Thanjavur.

Periyar PURA: Recently I had visited Periyar Maniammai College of Technology for Women and inaugurated a PURA Complex. I thought of sharing with you the developmental concept of a cluster of over 60 villages near Vallam, Thanjavur district of Tamil Nadu which involves a population of 3 lakhs. This PURA complex has all the three connectivities - physical, electronic and knowledge — leading to economic connectivity. The centre of activity emanates from the women engineering college that provides the electronic and knowledge connectivity. Periyar PURA has health care centres, primary to post-graduate level education and vocational training centres. This has resulted in large-scale employment generation and creation of a number of entrepreneurs with the active support of 850 self-help groups. Two hundred acres of waste land has been developed into a cultivable land with innovative water management schemes such as contour ponds and water sheds for storing and irrigating the fields. All the villagers are busy in either cultivation, planting *Jatropha*, herbal and medicinal plants, power generation using bio-mass, food processing and above

all running marketing centres. This model has emanated independent of any government initiative. The committed leadership has been provided by the engineering institution. This gives me the confidence that PURA is a realizable proposition and this movement can be multiplied by thousands of entrepreneurs, educational administrators and philanthropic institutions with the support of the government agencies.

A message I have received is that most Indians, experienced and old, energetic and middle-aged, young and innocent, they all look to religion for solace and safety. I have also visited great many religious places and houses of worship throughout the length and breadth of this great country and I have met many of our religious leaders. The religions are like exquisite gardens, places full of surpassing beauty and tranquility, like sacred groves filled with beautiful birds and their melodious songs. I truly think that religions are beautiful gardens. They are enchanting islands, veritable oasis for the soul and the spirit. But they are islands nevertheless. How can we connect them so that the fragrance engulfs the whole universe? If we can connect all the islands with love and compassion, in a 'garland', we will have a prosperous India and prosperous world. Let me highlight how the fusion of science and religion led to the transformation of religion into spiritual force.

I would like to recall an incident which happened four decades ago. As you all know, Prof Vikram Sarabhai is the visionary of space programme in the country. He is well known for his cosmic ray research area that led to evolving the space research programme for the nation. Both Dr Homi Bhabha and Prof Vikram Sarabhai were looking for a site to establish a space research station in the equatorial region. These two great scientists visited a number of places. Thumba in Kerala was selected by the scientific community for space research as it was near the equatorial region and was ideally suited for ionospheric research in upper atmosphere apart from study of atmospheric structure. When Prof Vikram Sarabhai visited Thumba, the locality had series of villages and thousands of fisher folk were living in that area. It also had a beautiful ancient church, St Mary Magdalene Church, Pallithura and a Bishop's House. Prof Vikram Sarabhai met many politicians and

bureaucrats to get the place for the work of space science research. It did not move further because of the nature of the place. He was asked to see the Bishop of Trivandrum, at that time in 1962, His Excellency Rct Rev Dr Peter Bernard Pereira. It was a Saturday when Prof Vikram Sarabhai met the Bishop. The Bishop smiled and asked him to meet him the next day, i.e. Sunday. In the morning Service, the Bishop told the congregation, “my children, I have a famous scientist with me who wants our church and the place I live for the work of space science research. Dear children, science seeks truth by reasoning. In one way, science and spiritualism seek the same divine blessings for doing good for the people. My children, can we give the God’s abode for a scientific mission?” There was a chorus of ‘Amen’ from the congregation and the whole church reverberated. Subsequently, the big event took place in 1962. His Excellency Rct Rev Dr Peter Bernard Pereira, the Bishop of Trivandrum, took the noble decision to dedicate the church in recognition of the national goal for the establishment of the Indian Space Research Organisation at Pallithura, Thumba. That was the church where we had our design centre, started rocket assembly, design of filament winding machine for FRP product and the Bishop’s house was our scientists’ place. Later, the Thumba Equatorial Rocket Launching Station (TERLS) led to the establishment of Vikram Sarabhai Space Centre (VSSC) and multiple space centres throughout the country.

When I think of this event, I can see how enlightened spiritual and scientific leaders, all converge towards giving reverence to human life. New church and new schools were established in record time. Of course the birth of TERLS and then VSSC gave the country the capability of design, development and produce world class huge rocket system and subsequently, India has the capability of launching geo-synchronous, sun-synchronous and meteorology spacecraft, communication satellite, remote sensing satellite thereby providing fast communication, weather forecasting and also locating water resources for the country. Today, among us, Prof Vikram Sarabhai is not there, Rev Dr Peter Bernard Pereira is not there, but those who are responsible for creation and make the flower and blossom will themselves be a different kind of a flower as described in the *Bhagavad Gita*: “See the flower, how generously it distributes perfume and honey.

It gives to all, gives freely of its love. When its work is done, it falls away quietly. Try to be like the flower, unassuming despite all its qualities.” What a beautiful message for all generation of this nation, on integration of minds and universal mind!

As you all know, the United Nations was established in 1945 after the Second World War with the mission of bringing peace among nations and resolving conflicts as they arise so that war will not be waged between nation and nation. What the world has witnessed today is that two major unilateral wars have taken place in spite of the United Nations. Hence, we need a world body which can facilitate bringing peace, prosperity and knowledge to the nations, irrespective of the economic status of a particular nation. Indeed the vision of the new world body has to be facilitating the evolution of enlightened citizen in the planet.

I have discussed so far the evolution of enlightened citizen with its dimensions of education with value system, national development and religion transforming into spirituality. Since this JNU is a place of intellectuals with economic and societal concern, I put forth these thoughts for your discussion. Definitely, you can get in touch with me through my website www.presidentofindia.nic.in.

Now I would like to recall an incident, which happened during one of my visits after becoming the President. During my tour to the State of Bihar, among other programmes I visited various spiritual places, Bodh Gaya, and the famous Nalanda University. I walked through the monument and I saw a big hostel, a beautiful study hall of Buddhist philosophy and the college where teachers and students from nearly 63 countries used to study theology, religion and spiritualism.

Why it happened in this country in the 5th century AD? Our civilizational heritage attracted students from various parts of the world. Similarly time has come when an institution like JNU has become a place of learning and research in attracting students from many parts of the world. Great teachers of the university attract the best students. JNU can have a vision of becoming a modern Nalanda.

Every one of us has gone through the various phases of education from childhood to profession. A scene appears in front of me. When the child is empowered by the parents, at various phases of growth, the child transforms into a responsible citizen. When the teacher is empowered with knowledge and experience, good young human beings with value systems take shape. When individual or a team is empowered with technology, transformation to higher potential for achievement is assured. When the leader of any institution empowers his or her people, leaders are born who can change the nation in multiple areas. When the women are empowered, society with stability gets assured. When the political leaders of the nation empower the people through visionary policies, the prosperity of the nation is certain. The medium for transformation to developed India is the empowerment at various levels with power of knowledge of the enlightened citizens.

Towards a Disease-free India

I AM DELIGHTED to participate in the first Convocation of King George's Medical University, Lucknow in the centenary year. I congratulate all the under-graduate and post-graduate students for their academic performance and the faculty members for shaping the young minds. My greetings to the chancellor, vice-chancellor, faculty members, medical experts, scientists, technologists, government functionaries and distinguished guests. I understand that during the last century the University has generated more than fifteen thousand medical professionals who are playing a key role in providing quality medicare to the needy patients in different parts of the world. The University is now capable of imparting medical education annually for over 300 students.

When I am in the midst of the medical community, I am reminded of the famous statement by Norman Cousins in his book 'Anatomy of the illness'—Patients are today reaching out to the doctor not just for medical help. They are reaching out for kindness, assurance and hope. I would also like to share with you a quote in the paper which I came across on the topic 'One World, one people, one surgery' by Dr. T.E. Udhwadia which states: "The poorest of the poor have as much right as anyone to less pain after surgery, reduced medication, less morbidity, shorter hospitalization, and early return to home, family, and work. Minimal access surgery and the expensive technology it requires are advocated, not as homage or tribute to new technology, but in appreciation of the manifold benefits this new technology gives to our patients and our people." This thought has to be the focus of all the graduates and post-graduates completing their medical studies and entering into a professional career from this University. My topic for discussion is "Towards a disease-free India."

First I would like to discuss some of the diseases pattern visible in certain tribal areas. I would like to share with you this information, show that you will see the clinical data and try to find out the solution.

Recently, when I visited Chattisgarh, I was informed by various authorities that sickle cell anaemia disease is prevalent in tribal areas and even in the adjoining States including parts of U.P. I understand over 25 lakh population suffer from this disease and large number of children die every year due to complications caused by sickle cell disease among the mothers. Life expectancy of this population is quite low and it is reported that this disease is a silent killer. The Medical Researchers of India have to take up this task in all earnestness.

Dr. Kmiec had shown that the new gene repair technology may hold promise as a treatment for sickle cell anaemia and other diseases by correcting the DNA mutation from which they arise.

Sickle cell disease is an inherited condition. Two genes for the sickle haemoglobin must be inherited from one's parents in order to have the disease. A person who receives a gene for sickle cell disease from one parent and a normal gene from the other has a condition called sickle cell trait. Sickle cell trait produces no symptoms or problems for most people. Sickle cell disease can neither be contracted nor passed on to another person. The severity of sickle cell disease varies tremendously. Some people with sickle cell disease lead lives that are nearly normal. Others are less fortunate, and can suffer from a variety of complications. Some of the common symptoms seen in the patients suffering from sickle cell anaemia include i) anaemia, ii) intermittent jaundice, iii) severe joint pains, iv) recurrent infections. These symptoms appear between the ages of four and five and severity increases with advancement of age. The available treatment strategies can be divided into anti-sickling agents, vasoactive drugs, bone marrow transplantation and gene therapy. During my visit to Chattisgarh, I found this disease prevalent in tribal areas and I would recommend to the members of King George Medical University to apply their mind collectively to find preventive and post-occurrence cost-effective treatment for this dreaded disease. Since some of the graduates and

post-graduates may seek employment in rural areas I would suggest they can take special care in treating patients having sickle cell disease. Now, I would like to discuss multi-dimensional solutions for the treatment of Coronary Artery Disease.

As per one of the studies, only 8% of the world population has access to heart surgery delivery systems. Out of the 6.5 lakh surgeries taking place in a year, 4.5 lakhs are performed in USA alone, only 2 lakhs are performed in the rest of the world. In India fifty to sixty thousand operations are performed every year, whereas possibly 2.5 million people may need heart operations in India. Another observation is that the occurrence of coronary artery diseases in India is taking place between the age group of 35 and 55, whereas in the western world, it generally occurs after 55 or 60. The main reason for this in India is attributed to the urban life style and intake of rich food having high cholesterol. It is also found that the occurrence of cardiovascular cases is 4% in rural area as against the 10% found in big cities in India, whereas the world statistics say that the incidence is only 3 to 4%. A research is essential for establishing the reasons for occurrence of heart ailments among Indians at a young age and also the reduced occurrence of the disease in rural areas. The results of the study will assist in national planning for combating the heart ailment.

This also shows that the urban life and the facilities come at the cost of deteriorated environment detrimental to one's heart and life. The PURA — Providing Urban Amenities in Rural Areas — would overcome this drawback and establish that the urban comforts can be brought to the rural areas without the drawbacks associated with the rural lifestyles.

It is reported that Indians are genetically more vulnerable to heart attacks wherever they are than Americans and Europeans. My Doctor friends say, rheumatic heart disease, which leads to heart valve destruction, is peculiar to the Indian community. This arises out of poverty and poor socio-hygienic living conditions of our population, which results in rheumatic fever in young age, leading to one in every thousand children suffering from rheumatic heart ailments in later

years. You may like to discuss this situation and possible solution in the university. In India over hundred and fifty thousand children are born with congenital heart diseases every year. Out of these 85% of them have risk of life before any treatment reaches them, and approximately 40% could be saved if timely diagnosis and proper pre-operative preparation of the child is done. Pre-operative preparation and the surgical intervention are time-sensitive and vary with the time of detection of the ailment. Due to lack of timely detection, Medicare not reaching the children leads to high rate of mortality. With the present estimates only one per cent of the 1.5 lakh children are saved after proper medical intervention. I would suggest the remedy for this situation lies in screening and detection of existence of rheumatic heart ailment in the child, right at birth, so that the parents can be advised about the state of the child, when he or she leaves the hospital. I was told this type of screening is presently available only in big hospitals like AIIMS, Narayana Hrudayalaya and other few big health care centres. I would suggest that it can become a routine medical practice in Kings George Medical Hospital also.

The health care study 2020 has given possible diagnostic, preventive methodology with focus on early and periodical diagnosis, improvement in socio-hygienic conditions and better nutrition including pre-natal nutrition. We are now witnessing treatment of coronary artery disease moving from very invasive to less invasive methods. In the seventies bypass surgery was the big news, in the eighties it was balloon angioplasty and in the nineties it was the stented angioplasty.

Now, moving a step further is a totally non-invasive treatment—External Counter Pulsation (ECP), a truly non-operative, non-pharmaceutical, safe and effective treatment. ECP is Food and Drug Administration (FDA) (USA) approved and finds reference in medical and cardiology textbooks. Many articles have been published in a number of specialist Journals worldwide on this subject. The success of ECP can be judged from the fact that in USA the insurance sector reported that the reimbursement for ECP has gone up by 6 % whereas that of other procedure like angioplasty, bypass surgery, etc. has come

down by 7%. Now the treatment is available in most of the leading hospitals of the world.

In India, ECP is available at Sibia Medical Centre, Ludhiana besides Escorts Heart Institute and Research Centre, New Delhi, Peoples General Hospital, Bhopal, Jamnagar etc.

It is well known that following bypass surgery only 75% patients are symptom-free for 5 years or more and only 50% after 10 years or more. The number of patients having recurrence after bypass, ballooning and stenting is increasing and for them ECP is the only FDA approved treatment available which is documented to increase the blood supply to the heart by 20-42%, to the brain by 22-26% and to the kidneys by 19%. ECP also increases heart's output. More patients now prefer non-invasive treatments. With improved cerebral circulation patients may notice improved memory, etc. Graduates and Post-graduates from this Institute may consider effective application of ECP as a treatment for heart care.

The King George Medical University can study the various treatments for cardiac diseases available including ECP and suggest through a research paper the choice of treatment with reference to the disease pattern.

There is a need to propagate the importance of appropriate food habit and lifestyle among the urban population to combat the situation of increased occurrence of heart ailment. Hospitals in the country should take proactive steps to counsel their clients in a family atmosphere for ensuring reduction in this number in the years to come. Another feature which has been noticed is that there is a competition, between cardiologists and surgeons in treating heart cases. The ideal practice should be to provide only the minimum essential treatment instead of going in for surgical intervention as a routine management of the disease.

It has been reported that the repeated occurrence of heart ailments is caused by diet, smoking, lack of exercise and uncontrolled diabetes. These factors can be controlled by an appropriate lifestyle intervention. I have seen the change of lifestyle pattern practically taking place in

Global Hospital and Research Center, Mount Abu. There was a joint project of Defence Institute of Physiology and Allied Sciences (DIPAS), DRDO and the Global Hospital and Research Center for studying the effect of “holistic lifestyle intervention” on the patients suffering from Coronary Artery Diseases during the year 1997-98. The project involved both Control Group and the Experimental Group. The Control Group was subjected to conventional treatment whereas the Experimental Group was supported by an intervention involving low fat, high fibre vegetarian diet, aerobic exercises and meditation. This three-dimensional psycho-physiological mind-body approach in treating heart patients of the Experimental Group resulted in dissolution of angiographic plaque and improvement in microcirculation of blood in heart muscles of the patients. The treatment was also supported by participation of spouses and other family members of the patients, leading to a unique family system approach to Medicare. These results of three dimensional approach to counter cardiac diseases should be discussed in the medical college lecture forum and seminars and a scientific view can be taken and propagated.

In the treatment of both rhinitis and asthma treating the underlying inflammation is crucial along with relief of symptoms. I understand drugs like inhaled or intranasal steroids are crucial to controlling the inflammation and disease progression. These drugs have been proved to be safe and usage of appropriate controlled medication would prevent long term economic costs and morbidity. One should think of both immediate as well as long term implications of the treatment regime. The definition of recovery in these allergic diseases varies. Can we call the temporary relief as cure? This needs to be discussed by the medical community. I have also seen in the pharma industry, development of new drugs from molecules which will provide better cure for inflammatory diseases. When the graduates enter into their profession this information will be of use.

I have seen the website of the alumni of King George Medical University. This can become a common platform for providing connectivity amongst thousands of medical professionals particularly the alumni of King George Medical University practising in different

parts of the world. The website can document the case studies and special treatment regimes followed by different specialists and also the novel diagnostic techniques used by them for treating many diseases. You could also include provision for the common man to ask questions about his specific problems connected with his disease which can be answered by a panel of specialist doctors belonging to King George Medical Community. This will lead to automatic generation of a database of such patients and make treatment of these diseases available by specialists at an affordable cost. However, the confidentiality and anonymity of the patient has to be maintained by the website. This website can be used for creating awareness regarding various diseases, their symptoms and the appropriate time when the patient consults a specialist doctor. You can also extend the services of the doctors and the students to the rural areas of Uttar Pradesh, through tele-medicine in a number of rural centres and mobile tele-medicine clinics to the rural villages on a scheduled date and time periodically. This will be a great service provided by the 15,000 alumni, staff and students of this University to the needy. This is all the more possible in view of the availability of EDUSAT and its connectivity for hundred thousand locations including the rural areas. The University may request the Indian Space Research Organisation (ISRO) to give them connectivity for medical education and training.

As you all know, India is committed to 100% eradication of polio cases by the year 2005. One of the two states controlling the happening of this event is Uttar Pradesh. Hence, it is essential that the scientific and medical members of King George University should work in collaboration with the Polio eradication team of U.P. and take it as a mission to make U.P. polio free by the year 2005.

Medical profession is a noble profession and it has always been patient-centric. The patient has the right to have the right type of medical care, with right type of medical practitioners. How does a patient know, whether he should go to an ENT specialist, or an allergy specialist or a chest specialist? He is made to go from one place to another in search of the right specialists. An integrated mechanism is needed to see that patient without frustration is directed to the right

specialist for right diagnosis at the right time at a right cost. The graduates and post-graduates of this University should keep this aspect in mind while practising this noble profession in rural and urban areas of our country.

Enriched with the knowledge provided by the King George Medical University, I am confident that you will succeed in the mission of removing the pain of the poor.

Womanhood – A Beautiful Creation of God

I AM DELIGHTED to meet and interact with the students of Navodaya Vidyalayas, Kendriya Vidyalayas, Lady Irwin School, Sadhu Vaswani Mission School and Delhi Government Schools. I greet the Chairperson and Members of National Commission for Women for organizing this function.

My best wishes to the principals, teachers, staff, students and distinguished guests assembled here. While talking to you, I recall a prayer written by Mahakavi Bharathiyar, which is presented here:

இடையின்றி அணுக்களெலாஞ் சுழலுமென
இயல்நூலார் இசைத்தல் கேட்டோம்;
இடையின்றி கதிர்களெலாஞ் சுழலுமென
வானூலார் இயம்புகின்றார்
இடையின்றித் தொழில்புரிதல் உலகினிடைப்
பொருட்கலெல்லாம் இயற்கை யாயின்
இடையின்றிக் கலைமகளே நினதருளில்
எனதுள்ளம் இயங்கொணாதோ?

This means: Physicists claim atoms are always on a circuitous motion. Astronomers claim every planet and their stars are on an orbital motion. If perpetual motion be the nature of things all around, O! My Goddess of Learning! Kindly bless my mind also to work as vigorously as ever!

Address to the Girl Children of the Capital Organized by The National Commission for Women, New Delhi, 17 January 2005

I think it is an important message for all of us, for continued acquisition of knowledge and continued prosperity.

Womanhood is a beautiful creation of God. Always I am inspired and rejuvenated by two great women. One is my mother and the other is Bharat Ratna M. S. Subbulakshmi. For a few minutes I would like to share my thoughts with you about these two great souls.

During the II world war in 1941, in Rameshwaram, it was a difficult time for our family. I was a ten year old boy. War had almost reached our doors of Rameshwaram, i.e. Sri Lanka. Almost everything was a rarity from food articles to anything. Ours was a large joint family. My father and his younger brother's families were all living together. The size of our family was five sons and five daughters and three of whom had families. I used to see in my house anytime three cradles. My grandmother and mother were almost managing this large contingent. The environment in the home alternated by happiness and cry. I used to get up at four in the morning, took bath and went to my teacher Swamiyar for learning mathematics. He will not accept student for teaching if the student had not taken bath. He was a unique mathematics teacher and he used to take only five students for free tuition in a year. My mother used to get up before me, and gave bath to me and prepared me to go for the tuition. I used to come back at 5:30 when my father would be waiting for taking me to the Namaz and Koran Sharif learning in Arabic school. After that I used to go by walk to Rameshwaram Road Railway station three kilometre away. Madras Dhanushkodi mail will pass through the station but will not stop, since it was a war time arrangement. The newspaper bundle will be thrown from the running train.

I used to collect the paper and run around the Rameshwaram town and be the first one to distribute the newspapers in the town. My elder cousin brother was the agent who went away to Sri Lanka in search of better livelihood. After distribution I used to come home at 8 a.m. My mother will give me a simple breakfast with a special quota compared to other children because I was studying and working simultaneously. After the school is over in the evening, again I will go around Rameshwaran for collection of dues from customers. One

day I still remember an incident. As a young boy since I was walking, running and studying all together when all my brothers and sisters were sitting and eating, my mother went on giving me chapaties (even though we are rice eaters only wheat was rationed). When I finished eating, my elder brother called me privately and scolded, Kalam do you know what was happening? You went on eating chapatis and mother went on giving you. She has given all her chapatis to you. It is a difficult time. Be a responsible son and do not make your mother starve. First time I had a shivering sensation and I could not control myself. I rushed to my mother and hugged her. Even though I was studying in 5th class, I had a special place in my home because I was the last guy in the family. There used to be no electricity. Home was lit by the kerosene lamp that too between 7 to 9 p.m. My mother specially gave me a small kerosene lamp so that I can study up to 11 p.m. I still remember my mother in a full moon night which has been portrayed with the title “mother” in my book “Wings of Fire”.

I still remember the day when I was ten,
 Sleeping on your lap to the envy of my elder brothers and sisters.
 It was full moon night, my world only you knew
 Mother!, My Mother!
 When at midnight, I woke with tears falling on my knee
 You knew the pain of your child, My Mother.
 Your caring hands, tenderly removing the pain
 Your love, your care, your faith gave me strength,
 To face the world without fear and with His strength.
 We will meet again on the Great Judgement Day. My Mother!

This is the story of my mother who lived ninety three years, a woman of love, a woman of kindness and above all a woman of divine nature. My mother performed Namaz five times every day. During Namaz, my mother always looked angelic. Every time I saw her during Namaz I was inspired and moved.

I will now talk to you about another great mother, mother of Carnatic music M. S. Subbulakshmi. First time in the year 1950,

I heard her when I was studying in the college at Trichy during Thiagaraja festival at Tiruvaiyar, which is conducted in January every year. I attended this festival with my close friend and music lover Santhanam. After Pancharatna Kṛiti, M.S. Subbulakshmi sang the famous Thiagaraja keertana “Endaro Mahaanubhavalu andhariggi vandanamulu.” This song really entered into me and blossomed happiness in my body and soul. The meaning was so powerful; I was moved and became a lifetime fan of M.S. I started liking her statement in the music academy, leading to music learning.

“Bhakti is nothing but the devotion we show to the divinity that resides within us. Once we regard the divinity within us with devotional fervour, we are bound to develop the same affection towards everything outside. The reason is that the same divine truth runs through all things. When the devotee has attained this state, service to the world becomes his creed.”

I used to meet her in music concerts. It was a great joy for me when M.S. was honoured with Bharat Ratna in 1998 at Ashoka Hall in Rashtrapati Bhavan. I was sitting by her side. She touched my head and blessed. That was my greatest moment in my life. She gave one statement which I would like to recall. “Any raga has the purpose of directing the minds of the listeners towards God and His manifestations.” Further I have met this great soul many times when she was not well. When she passed away on 12 December 2004, I was there in her house, where I saw a spiritual peace. My tribute to her read as follows:

“You excelled in Sriragam,
And achieved great heights in Bhakti Sangeet
You excelled in the Kirtanas of Annamacharya,
Purandaradasa and Trinity of Carnatic music.
Even though, you may have merged with time,
Your music with beautiful deeds will live for a long time to come.
You were born in music, lived with music,
And now forever you are merged with divine music.”

Now I would like to discuss my experience at Rudahi a village in Uttar Pradesh on January 14, 2005. During the interaction, a girl, her name is Komal Singh. She is studying in Class VIII. She asked me: “Mr. President, you are a missile man. Is it possible to make a missile that would promote world peace?”

My reply to this question was India has always been espousing the cause of the greatest missile “Ahimsa Dharma”. The principle of non-violence. To prevent war we have to be strong first. Strength respects strength. In that light, our other missiles are also required. But our principle is “no first use”. Now my thoughts go back to 2500 years in history. I see in front of me the Emperor Asoka conquering all parts of India and walking with great pride. When he came to Kalinga region, the great Kalinga war took place, which is now in the present state of Orissa. The mighty army of Emperor Asoka fought and fought and the Kalinga kings were defeated. Emperor Asoka happily proclaimed and annexed the Kalinga country. In that great full moon night, with the success behind him, Emperor Asoka walked in the war ravaged battlefield. He stopped suddenly and saw the blood flowing over hundred thousand people who were killed, and many souls crying and moaning. That crying was engulfed in gloom. Suddenly Emperor Asoka stopped and asked himself, “O! Almighty, what have I done?” This spark of thought entered into the mind and soul of Emperor Asoka and the great principle of Ahimsa Dharma was born.

At this point of time, I would like to recall my travelling on 16 September 2004 in a train powered by steam engine in a first class compartment of 1900's vintage organized by Durban state of South Africa. When the train was moving from one station to another, Mahatma Gandhi's struggle against apartheid system in South Africa was going through my mind. The train halted at Pietermaritzburg, the station where Gandhiji was evicted on a cold winter night from a first class compartment and became a victim of apartheid. When I alighted at the Pietermaritzburg railway station, I saw a plaque in the railway station, which reads like this:

In the vicinity of this plaque
M.K. GANDHI was evicted
from a first class
compartment on the night of
7 June 1893.

This incident changed
the course of his life.
He took up the fight
against racial oppression.
His active non-violence
started from that date.

Later, I visited the Msunduzi Municipality where the Indian team was given a beautiful civic reception by the Indians and South Africans. But my thoughts were hovering on two scenes which I experienced in South Africa. One scene was, in Robben Island where Dr. Nelson Mandela had been imprisoned for 26 years, in a very small cell, and the other scene was at the house of Dr. Nelson Mandela. What a moving reception, the man at the age of 86 gave with all smiles. He had experienced a life in prison for 26 long years and also a beautiful life as a President of independent South Africa. When I was leaving his house he came to the portico to give me a send off and while walking he discarded his walking stick and I became his support. While walking I asked him, “Dr. Mandela can you please tell me about the pioneers of anti apartheid movement in South Africa?” He responded spontaneously, “of course one of the great pioneers of South Africa’s freedom movement was MK Gandhi. India gave us MK Gandhi, we gave you back Mahatma Gandhi after two decades. Mahatma Gandhi was an apostle of Non-Violence”. That is indeed the tradition of India — to enrich whichever nation we go to, our foremost responsibility is to enrich that nation. Enriching the nation is not only in financial terms, but enrich with knowledge, enrich with sweat, and above all enrich with honour and self dignity.

I would like to share with you some of my experiences which I had during my recent visit to South Africa. I met a great personality

who was responsible for the freedom of South Africa. Particularly for the young people, you can learn two lessons. They are: indomitable spirit and virtue of forgiveness. He is none other than Dr. Nelson Mandela.

Cape Town is famous for its Table Mountain; it has got three peaks called Table Peak, Devil Peak, and Fake Peak. Between the peaks it was a beautiful sight throughout the day, sometimes dark clouds and sometimes white clouds embracing the peaks. Table Mountain is very close to the coast of the Atlantic Ocean. We travelled by helicopter to Robben Island from Cape Town in 10 minutes flight. By fast powered boat it will take 30 minutes to reach the Robben Island. When we reached the Island, except sea roaring, the whole island was a silent place symbolizing the thought: this is the place the freedom of individual was chained. We were received at the Island by Mr. Ahmed Kathrada a South African, who was a co-prisoner. What surprised me was this: can you imagine a tiny room, where sleeping and all human needs have to be fulfilled. It has to be remembered that Dr. Nelson Mandela, who was 6 feet tall was imprisoned in that room for 26 years — fighting against the apartheid. The major part of his life was spent in this silent Island. He used to be taken for quarrying in the nearby mountain for a few hours in bright sun. This is the time his sight got damaged. In spite of his body being tortured, he revealed to the world the indomitable spirit in him. This is the time he evolved a manuscript of freedom in tiny letters every day, when the jail wardens went to sleep. This small tiny lettered manuscript finally became the famous book of Mandela, “A long walk to freedom”.

It was a great event for me to meet him in his house in Johannesburg. I would like to share with you, when I entered Dr. Nelson Mandela’s house, I saw his three dimensional form with cheerfulness: the mighty man who got the freedom for South Africa from the tyranny of apartheid. And also a person when he became the President of South Africa he gave the people freedom to move, freedom to live in South Africa to those people who specialized in apartheid and ill-treated and put him in jail for 26 years. Nelson Mandela accepted them as equal citizens who ill treated them practising apartheid. A big lesson that we learnt from this personality Dr. Nelson Mandela which is explained in one of the Thirukkural, written 2200 years

before.

இன்னா செய்தாரை ஒறுத்தல் அவர்நாண

நன்னயம் செய்து விடல்

which means, for those who do ill to you, the best punishment is returning good to them.

Our nation is going through a major challenge of uplifting of 260 million people who are below the poverty line and also to give better life for many millions who are on the border line of poverty or just above the poverty line. They need decent habitat, they need work with reasonable income, they need food, they need health care, and they need education and finally a good life. Our GDP is growing at more than 6% per annum on an average, whereas, the economists suggest that to uplift the people from below the poverty line, our economy has to grow at the rate of 10% per annum consistently, for over a decade.

Integrated action: To meet the need of one billion people, we have the mission of transforming India into a developed nation. We have identified five areas where India has a core competence for integrated action:

- (1) Agriculture and food processing.
- (2) Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country.
- (3) Education and Healthcare.
- (4) Information and Communication Technology.
- (5) Strategic sectors.

These five areas are closely inter-related and if well done would lead to national, food, and economic security.

Engines for Growth: Emphasis should be on full utilization of natural and human resources of the nation to meet the demands of the modern society. We should also remember that about 50% of our

population is young people with aspirations for better living. Value addition to Agriculture, Manufacturing and Service sectors, building the national core competence and technologies will lead to additional high income employment potential. The engines for growth will be accelerated by launching of the five national missions, viz. water, energy, education and skills, infrastructure and employment generation that will enable achievement of 10% GDP growth rate per annum. It is possible to do so with ecological and economic sustainability.

With these aspects, we have already laid down the road map. The priority for the government is to convert the road map into various missions. While converting the vision into different missions we seem to have many thoughts and variety of routes to reach the goal. This is where there is a need to have a coherent thinking among all the members of the society. All of them need to think that the nation is greater than an individual or an organization. There is a mindset among many that “we cannot do it”. However in my experience with many institutions in the country and the observations of the results of some of them in the mission mode projects, I can assure you whenever we have decided to achieve certain goals with clear targets, we have always achieved it. I have seen this even in private and public sector industries — if they decide to take up tasks as a mission, they succeed. Let me discuss the evolution of knowledge society with you.

Knowledge has always been the prime mover for prosperity. A knowledge society is one of the basic foundations for the development of any nation. Knowledge has many forms and it is available at many places. The acquisition of knowledge has therefore been the thrust area throughout the world and sharing the experience of knowledge is a unique culture of our country. During the last few centuries the world has undergone a change and in the 21st century, a new society is emerging where knowledge is the primary production resource instead of capital and labour. Efficient utilisation of existing knowledge can create comprehensive wealth for the nation in the form of better health, education, infrastructure etc. for improving the quality of life. Whether a nation has emerged as a knowledge society or not is judged by the way the country effectively deals with knowledge creation and knowledge deployment.

The developing countries always have a mindset to follow step-by-step the footsteps of the developed countries, in the developmental process. This I call a beaten track. The reason is, there are multiple societies in every nation starting from agricultural society, industrial society, and information society leading to the knowledge society in the 21st century. These societies underwent a transformation from the agricultural society, where manual labour was the critical factor, to the industrial society, where the management of technology, capital, and labour provided the competitive advantage. The information era in the last decade saw networking within the country and with the other nations and the software products drove the economies. Some of the nations including India used this opportunity well and could demonstrate its core competence in IT. The entry to knowledge society has given India a great opportunity to bring back the glory of our nation again.

Efficient utilization of existing knowledge can create a comprehensive wealth for the nation and also improve the quality of life, in the form of better health, education, infrastructure, and other societal needs. The ability to create and maintain a knowledge society infrastructure, develop the knowledge workers, and enhance their productivity through the creation, growth, and exploitation of new knowledge, will be the key factor in deciding the prosperity of this knowledge society. Whether or not a nation has developed into a knowledge society is judged by the way it creates and deploys knowledge in the sectors like ICT, Manufacturing, Agriculture, and Health care and so on in order to create wealth for the society, business and the people. Knowledge and wealth creation have to go hand in hand in a knowledge society.

Recently, I read a news item where I find a 10 year old British school girl saved the lives of hundreds of people during the recent Tsunami episode on 26th December 2004 in Thailand by warning them a wall of water was about to strike, after learning about Tsunamis in her geography class taught by her teacher Mr. A. Kearney. She has been named “the angel of the beach” by the top-selling tabloid, “The Sun”.

Tilly was spending her holidays with her family on the Thai island of Phuket when she suddenly grasped what was taking place and alerted her mother. While she was on the beach she noticed that the tide was suddenly rushing out. As the other tourists watched in amazement, the water began to bubble and the boats on the horizon started to violently bob up and down. Tilly, who had studied tsunamis in a geography class just two weeks earlier, quickly realised they were in terrible danger. She told her mother they had to get off the beach immediately and warned there could be a tsunami. She explained she had just completed a school project on the huge waves and said they were seeing the warning signs that a tsunami was minutes away.

Her parents alerted the other holidaymakers and staff at their hotel, which was quickly evacuated. The wave crashed a few minutes later, but no one on the beach was killed or seriously injured. Tilly, from Surrey in England, gave the credit to her geography teacher, Andrew Kearney, at Oxshott's Danes Hill Prep School. She told that last term Mr Kearney taught about earthquakes and how they can cause tsunamis.

"I was on the beach and the water started to go funny. There were bubbles and the tide went out all of a sudden.

"I recognized what was happening and had a feeling there was going to be a tsunami. I told mummy." Tilly's mother said she was "very proud" of her daughter, while her headteacher Robin Parfitt said she had "wisdom beyond her years". Mr Kearney said he remembered teaching Tilly and her fellow students that after the sea was sucked backwards, the next five to 10 minutes were crucial for people to survive. He said her quick-witted actions were typical.

When the child is empowered by the parents, at various phases of growth, the child transforms into a responsible citizen. When the teacher is empowered with knowledge and experience, good young human beings with value systems take shape. When individual or a team is empowered with technology, transformation to higher potential for achievement is assured. When the leader of any institution empowers his or her people, leaders are born who can change the nation in multiple

areas. When the women are empowered, society with stability gets assured. When the political leaders of the nation empower the people through visionary policies, the prosperity of the nation is certain.

While concluding I would suggest that the students assembled here choose and fix an aim in life. Let that become the mission of your life. Work hard for your goal with patience and perseverance. While you are working for your goal there are bound to be hurdles and problems. You do not allow problems to become your master. You become master of the situation and defeat the problem. This is the secret of success in all your missions. Now I would like to administer the ten point oath to all of you. Will you all repeat?

Ten-point oath for enlightened citizenship:

1. I will love whatever profession I take up and I will try to excel in it.
2. From now onwards I will teach at least ten persons who cannot read and write to read and write.
3. I will plant ten saplings/trees and ensure their growth.
4. I will go to rural and urban areas to reform at least five persons from the habits of addiction and gambling.
5. I will take responsibility for removing the pain of ailing persons.
6. I will participate in the mission of realizing the economic strength of India by combining it with an education with value system and by transforming religion into a spiritual force.
7. I will not support any differentiation on account of community or language.
8. I will lead an honest life free from all corruption and will set an example for others to adopt a transparent way of life.
9. I will always be a friend of the mentally and physically challenged and I will work hard to make them feel normal.
10. I will celebrate the success of my country and my people.

Ingredients of Knowledge Society

I AM INDEED delighted to participate in the 16th Convocation of the Indira Gandhi National Open University (IGNOU). I greet the Vice-Chancellor, Pro-chancellor, Directors of schools, professors, teachers and staff for their contribution in shaping young minds to contribute to the nation in multiple fields. I take this opportunity to congratulate the University students for their academic performance. The universities have a major responsibility in nation building through imparting education to all those who aspire to learn more by providing distance education opportunity to students in remote areas in multiple disciplines. In addition, there are many students who interrupt their studies to earn for their family. They have a desire to improve themselves and also there are knowledge seekers. Distance education provides them such an opportunity. Thus Distance Education has a large socio-economic relevance. I am happy to note that this University has contributed substantially in the development of higher education in the country and have over 1.3 million students on their roll at present. This University has contributed to the cause of spreading education for the last one and half decades. I was thinking what thoughts I could share with the enlightened members of this distance learning centre. I have selected the topic “How to add value to distance education?”.

During the last century, the world has undergone a change from agricultural society, where manual labour was the critical factor, to industrial society where the management of technology, capital and labour provided the competitive advantage. Then the information era was born in the last decade, where connectivity and software products are driving the economy of a few nations. In the 21st century, a new society is emerging where knowledge is the primary production resource instead of capital and labour. The knowledge society is powered by

innovation capacity. Efficient utilisation of this existing knowledge can create comprehensive wealth of the nation and also improve the quality of life — in the form of better health, education, infrastructure and other social indicators. Ability to create and maintain the knowledge infrastructure, develop knowledge workers and enhance their productivity through creation, growth and exploitation of new knowledge will be the key factors in deciding the prosperity of this knowledge society. Whether a nation has arrived at a stage of knowledge society is judged by the way the country effectively deals with knowledge creation and knowledge deployment in all sectors like IT, industries, agriculture, health care etc.,

IGNOU has a major role to play in this transformation process of our society into a knowledge society through their value added distance education system. There has been considerable effort to apply technology for improving the delivery of distance education system over the years. With the availability of an exclusive education satellite (EDUSAT), the time is ripe for making intense use of ICT to create interactive virtual class rooms in all our remote areas. There are also a number of State and Central Universities which provide distance education. I believe they should share their experiences, teaching materials etc. to maximize the benefits for all the students. Now I would like to discuss the ingredients of Knowledge Society.

Knowledge is converted into wealth for social good through the process of innovation. Innovation is an important factor for the competitiveness of both service and manufacturing sectors. Innovation tends to emanate less from R&D and more from other sources including organizational change. Hence there is an urgent need to establish an innovation system in the country. Such a system would involve creation of clusters, which are networks. This network can include inter dependent firms, knowledge producing institutions/ universities, colleges/institutes, research institutes, technology providing firms/ bridging institutions, (for example think tanks, providers of technical and consultancy services) and customers linked in a value addition creating production chain. The concept of clusters goes beyond that of a firm network, as it captures all forms of knowledge sharing and

exchange. Thus, an innovative system with its clusters would tap into the growing stock of global knowledge, assimilate and adopt it to local needs and finally create new knowledge and technology. IGNOU should propagate the new knowledge among the 1.3 million students spread in different parts of the country and abroad. This will be the greatest contribution IGNOU will be making to provide value added education to the youth of the nation who are the vital resource for transforming India into a developed nation by 2020.

I understand that IGNOU has taken a number of steps to apply ICT for providing value added services to the distance education students. Your efforts in launching the Gyan darshan, Gyan vani, Tele-conferencing, interactive radio counselling, and students support services network are indeed a progressive step towards the distance and wider outreach of the education programmes. I understand that IGNOU is working with EDUSAT programme to create hundred point to point interactive terminals soon. Since you are in this mission, I would like to share my experience with a universal tele-education system implemented in Rashtrapati Bhavan.

A three-pronged approach is essential to make distance education programme viable and a successful proposition through the universal tele-education system to all remote parts of the country. Since the EDUSAT is providing the connectivity the other two essential components which are vital for the success of the programme are Tele-Education System and the Quality Content Generation and deployment.

I would like to narrate my experience in the development of a Tele-education delivery system. I had a dream; a good mathematics teacher teaching mathematics in a remote village like Chandipur in Orissa, should be able to teach a number of schools located in different parts of the country including Konkan villages in Maharashtra, interact with the students in sequence and be able to clarify the doubts. Also the teacher must be able to draw the knowledge from various sources, such as internet, digital library, generated creative content and the lectures given by various experts in the same field and deliver to all the students as if they are in the same simulated class room in a cost-

effective manner. Such a system has been implemented in Rashtrapati Bhavan.

This universal tele-education delivery system works via heterogeneous network platform through IP protocol. It provides virtual classrooms in a multi class and studio environment with seamless two-way interaction between the teachers and students in a collaborative framework. It provides seamless, one-to-one, one-to-many connectivity, through the broadcasting network in a multicasting mode of delivery. It seamlessly enables a remote teacher to become a teacher to all the students in a session. Unlike the other video conferencing systems and multimedia tools currently in use for tele-education purposes, this Interactive Universal Tele-education delivery system creates a virtual classroom. It enables the teacher to take the student to a live virtual tour of the subject. This provides a cost-effective solution for interactive content delivery. On a comparative basis we can create 250 nodes tele-education system for interactive delivery at a cost of establishing 4 multi-station video conferencing systems.

Recently, I addressed five colleges in different parts of Punjab as a part of Distance Education Programme. I referred in my classroom the subject that I was teaching, relevant Digital Library reference, a page from book reference and my talk delivered during an international conference on e-governance through my website. I could see all the class students from various locations. They can also see me and interact with me. Such an interactive tele-education delivery system is fully functional. This integrated solution will enable IGNOU to realize a cost-effective virtual dynamic classroom. IGNOU may like to study the system and make use of it for realizing the goals of the university to become a world class institution in distance education. This is particularly important in view of IGNOU imparting education in many foreign countries and having to compete with multinational universities. I understand that the universities abroad have already adopted such systems and the students are enriched through quality education imparted through the innovative use of ICT.

I will be very happy to take three classes relevant to the courses conducted by IGNOU as part of Distance Education Programme. These

lectures will be available to all the centres connected to IGNOU and they should interact with me live and have the facility to ask questions to which I can respond. Rashtrapati Bhavan will assist you in setting up the tele-education delivery system in the hundred interactive terminals for this programme. I am sure that this should be possible within the next three to four months' time. Now I would like to discuss the next important aspect in Distance Education, content generation, in which you have core competence and large library of multi-media content.

There are three components for education: lectures, practical or laboratory and library. The content includes all the above three. Content can be generated in many ways. The first one is the assimilation of the subject by an expert teacher through research study of many books and articles leading to the generation of quality and creative content in a presentable format. The teacher presents in a unique and innovative way to make the content appealing and easily understandable to the students. The second form of content could be on a self-learning method by breaking down the content into a series of question-answer models. Third may be from various books, which can be extracted through a digital library and presented just in time to all the remote students. Fourth may be from Internet, where wealth of information is available. Teacher may search the information in the Internet and push the content live through the tele-education system.

The content should have supportive animations, which may even bring virtual laboratories and virtual immersion effects to the remote students. When the content is generated, it should be a sharable learning object across the nation and across all platforms. I understand that IGNOU has already developed substantial amount of content during the last one and a half decades. The content can also be further improved by making use of the student's creative and innovative thoughts under the guidance of the expert teachers as a group activity as well as by sharing experiences with other DE programmes of other universities as I have suggested earlier.

As an example, my lectures delivered during various functions are dynamically updated in our website. During the address many participants ask questions on several topics. The answers to these

questions are also placed in the website as supplementary information. Similarly, the teachers after delivering the talk will also be asked a number of questions by the students. The proceedings of the questions and answers session can be added to the content document for enriching it. Now I would like to discuss how the Indira Gandhi National Open University can become a virtual university for promoting value added quality education to different parts of the country and abroad.

It is time that we should start looking at the possibility of converting IGNOU as a Virtual University in India through networking of the resources of different institutions based on their core competence. This Virtual University can have the following tasks:

- (a) Act as a central hub of all the resource centres of different networked institutions.
- (b) Identify experts of national/international eminence in specialized areas and nominate institutions of eminence.
- (c) Co-ordinate, organize, schedule and broadcast the lectures of specialists at a mutually convenient time to all participants.
- (d) Record the live transmission of the lecture with interaction details in a data bank for easy access by participants for review learning.
- (e) Digitize all the university libraries and make them available for seamless access by all the universities.
- (f) The whole distance education programme need to become learner-centric.

This experiment across the country will provide a common platform for teaching in colleges, universities and even vocational courses. This will give equal emphasis on theory and experiments in spite of the fact that it will be done in the cyberspace. Such is the power of the technology and our understanding of it. This facility would also help in expansion of telecommunication and IT services. All this would lead to value addition to the distance education programme through the synergy of multiple institutions. Now I would like to discuss the role of faculty members in capacity building among our youth.

Many of our faculty members have successfully groomed young innovators who can innovate and create innovative organisations, which are relevant to the society.

The success of your students is a testimony to your great service. I am sure that each one of you would create many innovators in the field of science, engineering, management, agriculture, law, information technology and other disciplines taught by this University.

For participating in the nation building tasks, the capacities required to be built among the students by the faculty members are: the capacity for research and inquiry, the capacity for creativity and innovation, particularly the creative transfer of knowledge, the capacity to use high technology, the capacity for entrepreneurial leadership and the capacity for Moral Leadership.

The aim of the faculty members should be to build character and human values, enhance the learning capacity of the students through technology and build the confidence among them to be innovative and creative which in turn will enable them to contribute towards making their organisations competitive in the global environment.

As you may be aware India has a mission of digitizing million books through a digital library programme. This has been initiated based on a proposal by Prof. Raj Reddy of Carnegie Mellon University (CMU), Pittsburgh and Prof. N. Balakrishnan of IISc, Bangalore. Prof. Raj Reddy, an NRI has taken a special initiative of creating this programme in India, his motherland for improving the educational system in the country. This has been his passion for many years. This programme is progressing well and we have already digitized 90,000 books out of which 50,000 are already on the web <http://www.dli.ernet.in>. Many of the books are in Indian languages. This Digital Library of India Initiative had also become test bed for many Indian Language Technology Researches including the development of Machine Translation Systems, OCRs, Summarizers and so on in Indian languages. More than 21 centres spanning academic institutions, social organizations and Government agencies including the Rashtrapati Bhavan have partnered in creating this huge repository of knowledge.

This programme is fully supported by the Ministry of Communication and Information Technology. IGNOU can utilize the facilities of the digital library initiative and digitize all the course material available with them for different disciplines. This will enable the university to offer a large number of e-learning courses and design web-based education.

Since IGNOU is working on Education programme for differently abled students, I would like to mention an experience relating to the provision of a special learning facility to the Visually Challenged students based on the discussions I had with Mr. Deependra Manocha who wrote to me a few months back about his inability to read my speeches in the website. Later, I met Mr. Asif Iqbal, who told that he was using the computer for his studies, exams, presentations and communications. For this he was using a third party software which is costly and beyond the reach of an ordinary person. This motivated me to think of getting software developed, which can become a versatile, low cost tool for all trainers and self help learning system for visually challenged persons through web.

Based on this thought, a Speech Applet “Virtual Vision” has been designed at Rashtrapati Bhavan. The main objectives were that it should be a versatile tool, have a voice enabled interface, configurable with any web server, provide an audio output of any web content on mouse-over and mouse click. It should be available to access through web, and be easy to deploy the course designed for visually challenged persons in an intranet and internet environment. The team has developed and produced a Speech Applet “Virtual Vision” having these characteristics within a period of seven weeks. It can be operated using a keyboard for its activation and deactivation of speech, which makes them feel interactive. The speech applet can be configured to an e-learning system, wherein the courses and training materials for the visually challenged persons can be deployed and they can learn with ease through this tool. IGNOU may like to study this applet and incorporate it as a part of the learning programme for visually challenged students. Now I would like to discuss about the need for innovation in the education system for preparing our youth to face global competition.

Since a large number of students have qualified from IGNOU during the last one and a half decades, I would recommend mobilizing of this vital resource for the development of the University which can be done through the establishment of a special portal.

The 470,000 alumni who have passed out from IGNOU during this period are presently working in different organisations. IGNOU should have a continuing education portal which provide educational services from its alumni, from the industry, from the academia to enlighten and enable the faculty and students with the real time experiences. Portal will act an interface between the alumni and the current students. They can share their experiences, they can discuss among themselves, they can give suggestion for teaching improvements, course contents, dynamic upgradation of the syllabus based on world wide developments, creation of employment opportunities and adaptation of technology application for improving the learning methods. IGNOU should find a method to attract the alumni to contribute for this portal and also organize yearly events to bring the alumni and the learners together for mutual benefit.

Ultimately, education in its real sense is the pursuit of truth and empowering ourselves to contribute to the society. It is an endless journey through knowledge and enlightenment and learning new skills for better life for all. Such a journey opens up new vistas of development of humanism where there is neither scope nor room for pettiness, disharmony, jealousy, hatred or enmity. It transforms a human being into a wholesome whole, a noble soul and an asset to the universe. Universal brotherhood in its true sense becomes the sheet anchor for such education. Real education enhances the dignity of a human being and increases his or her self-respect. If only the real sense of education could be realized by each individual, and carried forward in every field of human activity the world will be so much a better place to live in.

There is a need for IGNOU to have a mission to promote value-based quality education among the youth of the nation which is the foundation to ensure the creation of enlightened citizens who will make a prosperous, happy and strong nation.

Creativity adds beauty to Human Life

I AM DELIGHTED to address and interact with the students of schools and colleges of Port Blair. My greetings to the Principals, teachers and students of this beautiful island. I would like to discuss the topic “Creativity adds beauty to Human Life”.

I was thinking about creativity.

1. How it is created?
2. What is the source?
3. Is it genetic? Or
4. By learning, can it be created?

Dear children, can you tell me three important events which happened during the last two centuries that changed the human life in this planet? Any one of you?

Charles Darwin, who propounded the theory of “Natural Selection”. He made us think differently about how the evolution of human being took place. Thomas Alva Edison, who invented electricity, which has indeed revolutionized every field of science and technology and human life. Electricity is indeed the foundation for the growth of human life today. Mahatma Gandhi, whose Ahimsa Dharma movement against racial discrimination in South Africa and against British rule in India through non-violence. These three events of 20th century are the results of creative mind.

Look at the sky. We are not alone. The whole universe is friendly to us and conspires only to give the best to those who dream and work. Like, Sir C.V. Raman looked at the sea and the sky, and questioned

why the sea should be blue? This led to the birth of Raman Effect, he found the blue of the sea was due to the molecular scattering of light and was not a case of reflection of the sky in water as most people imagined.

One of the major breakthroughs in science in the 20th century that had an everlasting impact on the human kind is the most celebrated work of Einstein. Einstein explained, for the first time in 1905, the principle of the inertia of energy as a universal law. The famous energy equation $E=MC^2$ was given to the world. This equation has become the basis for converting matter into energy – giving birth to a new avenue called the nuclear energy for producing electricity to light up our cities and villages.

After this event, Einstein looked up at the space and saw millions and millions of galaxies and he noticed that we belong to one of the smallest galaxies. In the smallest galaxy, sun is the smallest star. In this smallest galaxy, we have nine planets and the planet in which the human race lives is an insignificant planet. But yet we have all types of lives, including human life. This led to creative astronomers like Copernicus, Galileo and Kepler who had given a new dimension to the world of astronomy. Today we take it for granted that earth is a globe, orbiting around the sun, and the sun orbits in the Milky Way. We are not alone. Human race is not a unique race in the universe. All the technological advancements we have today are the outcome of scientific exploration of scientists of earlier centuries. At no time, man was beaten by problems. He strives continuously to subjugate impossibility and then succeeds.

(According to the laws of aerodynamics) the bumblebee should be unable to fly. Because of the size, weight, and shape of its body in relationship to the total wing span, flying is scientifically impossible. The bumblebee, being ignorant of scientific theory, goes ahead and flies anyway

-John Maxwell

Human flight is nothing but creativity of human mind and it undergoes several struggles to achieve excellence. In 1890, a well-known scientist Lord Kelvin, who was the President of Royal Society of London said, “any thing heavier than air cannot fly, and cannot be flown.” Within two decades Wright Brothers proved man could fly of course at heavy risk and cost.

On the successful completion of Moon Mission in 1969, von Braun, a very famous rocket designer, who built Saturn-V to launch the capsule with astronauts and made moon walk a reality, in 1975 said “If I am authorized, I will remove the word impossible”.

In ancient days, Ptolemaic astronomy is a widely used system in calculating the dynamics of various stars and planets. Assumption by then was that the earth was flat. What scientific struggle had to take place to prove that the earth is spherical in shape orbiting around the sun!

Now I would like to talk to you about the evolution of enriched societies.

We have multiple societies in every nation starting from agricultural society, industrial society, and information society leading to knowledge society. During the 20th century, societies underwent a change from the agricultural society, where manual labour was the critical factor, to the industrial society, where the management of technology, capital, and labour provided the competitive advantage. The information era was born in the last decade. Networking within the country and with the other nations and the software products drove the economies. Some of the nations including India utilized this opportunity. In this decade we are just entering into knowledge society era.

The uniqueness of knowledge society is enriching the information society with innovation and value addition of products. The knowledge also enables value addition to the other three societies. In knowledge society, knowledge is the primary production resource instead of capital

or labour. I would like to discuss with you how we can work together to make our societies enriched by knowledge and transform them into knowledge society.

Knowledge can create a comprehensive wealth for the nation and also improve the quality of life, in the form of better health, education, infrastructure, and other societal needs. The ability to create and maintain a knowledge society infrastructure, develop the knowledge workers, and enhance their productivity through the creation, growth, and utilization of new knowledge, will be the key factor in deciding the prosperity of this knowledge society. Whether or not a nation has developed into a knowledge society is judged by the way it creates and deploys knowledge in the sectors like ICT, manufacturing, agriculture, services, education and healthcare.

The whole purpose of education in a country like India is to develop and enhance the potential of our human resource and progressively transform it into a knowledge society. The knowledge society will be a society producing products and services that are rich in both explicit and tacit knowledge, thus creating value added products. The real capital of this knowledge society will be its knowledge workers. The society will be highly networked to create knowledge-intensive environment along with enabling process to efficiently create, share, use and protect knowledge. Our education system should realign itself at the earliest and promote creativity and innovation among youth and equip them with skills to participate in the societal transformation, since these characteristics will be needed in producing, finding innovative applications and marketing in a competitive environment.

For success in any mission what we need is indomitable spirit. Let us study the characteristics of indomitable spirit. It has two components. The first component is that there must be a vision leading to higher goals of achievement. I would like to recall a couplet from Thirukkural by the Poet Saint Thiruvalluvar written 2500 years ago.

வெள்ளத் தனைய மலர்நீட்டம் மாந்தர்தம்
உள்ளத் தனைய துயர்வு

It means that whatever may be the depth of the river or lake or pond, whatever may be the condition of the water, the lily flower always comes out and blossoms. Similarly, if there is a definite determination to achieve a goal even if it is impossible to achieve, the man succeeds.

Many of us have gone through large programmes and projects. We would have experienced that success is not in sight and there are many hurdles. The same poet reminds us at this point of time through another couplet:

இடும்பைக் கிடும்பை படுப்பர் இடும்பைக்
கிடும்பை படாஅ தவர்

We should never be defeated by any problems. We should become master of the situation and defeat the problems. I consider these two Thirukkural's characterize the indomitable spirit.

Ten-point oath for enlightened citizenship:

1. I will love whatever profession I take up and I will try to excel in it.
2. From now onwards I will teach at least ten persons who cannot read and write to read and write.
3. I will plant ten saplings/trees and ensure their growth.
4. I will go to rural and urban areas to reform at least five persons from the habits of addiction and gambling.
5. I will take responsibility for removing the pain of ailing persons.
6. I will participate in the mission of realizing the economic strength of India by combining it with an education with value system and by transforming religion into a spiritual force.

7. I will not support any differentiation on account of community or language.
8. I will lead an honest life free from all corruption and will set an example for others to adopt a transparent way of life.
9. I will always be a friend of the mentally and physically challenged and I will work hard to make them feel normal.
10. I will celebrate the success of my country and my people.

Education with Value System

I AM HAPPY to participate in the 175th year celebrations of Scottish Church Collegiate School, Kolkata. My respects to Rev Dr. Alexander Duff and the Great Rajaram Mohan Roy who were responsible for forming the nucleus of the Scottish Church School with five boys in the year 1830. This institution had a pioneering role in imparting knowledge to the people of Bengal since the dawn of 19th century. I am delighted to know that this collegiate school has produced many distinguished personalities who are contributing in different disciplines in India and abroad. My greetings to all of you. I would like to discuss with all of you the topic “Creativity in Teaching”.

Where are we now? We have assembled here for participating in the 175th year celebration of Scottish Church Collegiate School. Kolkata is a small dot on the earth. Earth is a representative of the solar system. Earth constantly rotates around the Sun.

Earth while orbiting around the Sun keeps on rotating around its own axis. While doing so, how much time the earth takes to complete one rotation. One of you please answer. Earth takes twenty-four hours for completing one rotation on its own axis. This is how night and day are created. Apart from that what does earth do? Earth also orbits around the sun. How much time does it take for this orbital motion? 365 days, i.e. one year.

Your Scottish Church Collegiate school has orbited around the sun hundred and seventy-five times. This is the importance of hundred and seventy-five years. Let me pray to the almighty to provide continuous growth and prosperity in education to Scottish Church Collegiate School for many thousands of years.

When the students join the schools, it is important for the institutions to see what they should be remembered for? If the institution can develop enlightened citizens and moral leaders through value-based education then the institution will be remembered forever. The institution should create necessary environment to enable the students to transform into enlightened citizens.

National development is a collective process and has to be accomplished through the constructive efforts of enlightened citizens. The evolution of enlightened human beings is indeed a big challenge for the world community. I was asking myself, what will be the components of such a mission? There are three components to that. The first component is education with value system, second is religions graduating into spiritual forces to bring universal brotherhood, and the third is poverty eradication by attaining economic prosperity through a national vision.

The best part of a young person is his or her childhood in school and the best time spent is 0800 hrs to 1600 hrs in the school. The prime learning environment is 5th to 16th years of age. The student spends approximately 25,000 hours in the school campus. Of course, at home, love and affection are imparted but again most of the time of the day is spent in preparing school's homework and study, eat, play and sleep. Hence the school hours for children are the best time for learning and need the best of environment, mission-oriented learning with value system. I still hear the echo from Bestolozzy, a great teacher's saying, "give me a child for seven years. Afterwards, let the God or devil take the child. They cannot change the child." That is the great confidence of the teacher. What a golden mission a school can have! All the more, the teachers are in the centre of the mission. We need hundreds and thousands and lakhs of committed teachers, who can shape the minds of our youth. Technology can also play a part to propagate good teaching through tele-education. The best of dynamic triangle is child, teacher and parents. For parents and teachers, school campus and home have to have an integrated mission: education with value system. If the child misses the value-based education in the school, no government or society can establish a transparent society or a society with integrity.

The nations will target development milestones in a spirited environment instead of spending tremendous energy and time in problems initiated by small aims. This is the essential environment need for transforming India into a developed nation.

A message I have received is that most Indians, experienced and old, energetic and middle-aged, young and innocent, they all look to religion for solace and safety. I have also visited great many religious places and houses of worship throughout the length and breadth of this great country and I have met many of our religious leaders. The religions are like exquisite gardens, places full of surpassing beauty and tranquility, like sacred groves filled with beautiful birds and their melodious songs. I truly think that religions are beautiful gardens. They are enchanting islands, veritable oasis for the soul and the spirit. But they are islands nevertheless. How can we connect them so that the fragrance engulfs the whole universe? If we can connect all the islands with love and compassion, in a ‘garland’, we will have a prosperous India and prosperous world.

Now I would like to discuss what is needed at this juncture. Nearly 700 million people of India live in the rural areas in 600,000 villages. Rural prosperity depends upon building up both “content” and “connectivity” simultaneously. Connectivity of village complexes providing economic opportunities to all segments of people is an urgent need to empower the rural sector. The essential needs of the villages today are water, power, road, sanitation, health care, education, communication and other services needed for sustainable entrepreneurship and quality of life. For achieving this we need to establish 7000 PURA (Providing Urban Amenities in Rural Areas) clusters across the country, which will be a major source of rural enterprise development and employment generator.

The integrated methods, which will bring prosperity to rural India are: the physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through internet kiosks; knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and

entrepreneurship programmes; these three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, educational institutions, micro credits and marketing the products.

My visualization of that competitive Developed India profile by 2020 is as follows:

1. A Nation where the rural and urban divide is reduced to a thin line.
2. A Nation where there is an equitable distribution of energy and quality water.
3. A Nation where agriculture, industry and service sector work together in symphony, absorbing technology thereby resulting in sustained wealth generation leading to higher employment potential.
4. A Nation where education is not denied to any meritorious candidate because of societal or economic discrimination.
5. A Nation which is the best destination for the most talented scholars and scientists all over the world.
6. A Nation where the best of health care is available to all the billion population and the communicable diseases like AIDS/TB, water and vector borne diseases, cardiac diseases and cancer are extinct.
7. A Nation where the governance uses the best of the technologies to be responsive, transparent, easily accessible and simple in rules, thereby corruption-free.
8. A Nation where poverty has been totally eliminated, illiteracy and crime against women are eradicated and the society is unalienated.
9. A Nation that is prosperous, healthy, secure, peaceful and happy.
10. A Nation that is one of the best places to live in, on the earth and brings smiles on a billion plus faces.

These are the ten dimensional transformations needed for competitive India thereby Developed India and we have to work for.

As you all know, India has a vision – India 2020. That is before the year 2020, India has to become a developed nation and the country has human resource and natural resources. I have discussed all these in detail in my website: www.presidentofindia.nic.in.

When I see you all students I would like to conclude by narrating the event I have witnessed during my South Africa visit, particularly I saw a magnanimity in victory in a great leader. Let me share it with you.

I met a great personality who was responsible for the freedom of South Africa. Particularly for the young people, you can learn two lessons. They are: indomitable spirit and virtue of forgiveness. He is none other than Dr. Nelson Mandela.

Cape Town is famous for its Table Mountain; it has got three peaks called Table Peak, Devil Peak, and Fake Peak. Between the peaks it was a beautiful sight throughout the day, sometimes dark clouds and sometimes white clouds embracing the peaks. Table Mountain is very close to the coast of the Atlantic Ocean. We travelled by helicopter to Robben Island from Cape Town in 10 minutes flight. By fast powered boat it will take 30 minutes to reach the Robben Island. When we reached the Island, except sea roaring, the whole island was silent symbolizing the thought: this is the place the freedom of individual was chained. We were received at the Island by Mr. Ahmed Kathrada, a South African, who was a co-prisoner. What surprised me was this: can you imagine a tiny room, where sleeping and all human needs have to be fulfilled. It has to be remembered that Dr. Nelson Mandela, who was 6 feet tall was imprisoned in that room for 26 years – fighting against the apartheid. The major part of his life was spent in this silent Island. He used to be taken for quarrying in the nearby mountain for a few hours in bright sun. This is the time his sight got damaged. In spite of his body being tortured, he revealed to the world the indomitable spirit in him. This is the time he evolved a manuscript of freedom in tiny letters every day, when the jail wardens went to sleep. This small tiny lettered manuscript finally became the famous book of Mandela, “A long walk to freedom”.

It was a great event for me to meet him in his house in Johannesburg. Dear friends, I would like to share with you, when I entered Dr. Nelson Mandela's house, I saw his three dimensional form with cheerfulness: the mighty man who got the freedom for South Africa from the tyranny of apartheid. And also a person when he became the President of South Africa he gave the people freedom to move, freedom to live in South Africa to those people who specialized in apartheid and ill-treated and put him in jail for 26 years. Nelson Mandela accepted them as equal citizens who ill treated them practising apartheid. I felt that, I am touching the hand of a Mighty Soul. When he started walking he used to have a walking stick, he discarded the walking stick; I became his support – walking stick. Dear friends, a big lesson that we learnt from this personality Dr. Nelson Mandela which is explained in one of the Thirukkural written 2200 years before.

இன்னா செய்தாரை ஒறுத்தல் அவர்நாண

நன்னயம் செய்து விடல்

which means, for those who do ill to you, the best punishment is returning good to them.

Now I would like to administer the Oath for enlightened citizenship. Are you ready?

1. I will love whatever profession I take up and I will try to excel in it.
2. From now onwards I will teach at least ten persons who cannot read and write to read and write.
3. I will plant ten saplings/trees and ensure their growth.
4. I will go to rural and urban areas to reform at least five persons from the habits of addiction and gambling.
5. I will take responsibility for removing the pain of ailing persons.

6. I will participate in the mission of realizing the economic strength of India by combining it with an education with value system and by transforming religion into a spiritual force.
7. I will not support any differentiation on account of community or language.
8. I will always be a friend of the mentally and physically challenged and I will work hard to make them feel normal.
9. I will celebrate the success of my country and my people.

West Bengal is well known for freedom movement, for scientific innovations, literary and poetic achievements. Dear young friends, time has come for West Bengal to become a pioneer for another big movement. This movement has to start from our hearts, from home and from schools. Our nation in spite of all our best natural and human resources is haunted by corruption in public life, power and money. Only youth can change the situation. I will request you to take the following oath.

10. I will lead an honest life free from all corruption and I will set an example for others to adopt a transparent way of life.

Will you take up this movement towards corruption eradication right from your home?

Let me once again greet all the members of the Scottish Church Collegiate School on the occasion of 175th year celebration. My best wishes to all of you for the success in the mission of promoting excellence in education.

Music – An Elevating Experience for all

I AM DELIGHTED to participate in the conferment of the Sangeet Natak Akademi Awards for the year 2005. I greet the organizers, musicians, dancers, theatre artists, folk artists, art lovers and distinguished participants. The Sangeet Natak Akademi, which is now 53 years of age, has honoured many practitioners, Gurus and scholars in the performing arts, who represent the nation's highest achievement in Music, Dance and Drama. When I think of classical music I find that every Raga has a special purpose and meaning. I extend my congratulations to all the recipients of the Sangeet Natak Akademi Ratna and Sangeet Natak Akademi Puraskar for the year 2004. Today, I would like to talk on the topic "Music is a divine manifestation". Let me share with you a musical experience.

I recently attended a function to celebrate the 100 years of Bangalore Gayana Samaja. On this occasion, they recognized three artists: Hindustani Vocalist Dr. Gangubai Hangal (93 years), Carnatic vocalist Dr. R.K. Srikantan and Mirudangam Vidwan Shri Vellore Ramabadran with the centenary award. As a part of the celebrations, there was a programme by the Violin Maestro Dr. L. Subramaniam. He was accompanied by another young Violinist, Mridangam, Ghatam, Kanjira and Morsing Vidwans.

The artists before starting the music offered their prayers to the Almighty and paid their respects to the audience. The recital began with the kriti 'Vathapi Ganapatim Bhaje' composed by Muthusamy Dikshitar on Hamsadwani Raga and Adi Tala. L. Subramaniam played the violin solo; then together with young violinist in combination. Then the violin artist shared in sequence with each artist Violin, Mridangam, Morsing and Kanjira in the background of Swaram. The way the Maestro recognized the best of performance of every artist

Address during the Conferment of Sangeet Natak Akademi Awards 2005, Vigyan Bhawan, New Delhi, 26 August 2005

was indeed a beautiful scene. Every artist was bringing out the best of the music and it was well recognized by the audience. The peak was yet to come. In the final phase, all the artists together with the violin in the mid stream performed in unison and the whole audience merged with the musical rhythm.

The scene was indeed like a confluence of multiple river streams flowing rhythmically into the ocean of divine music. The twenty minutes of the integrated musical performance of the artists took the audience to the plane of bliss. There was a standing ovation from the audience for the musical performance that came out of the integration of hearts and minds of the artists. The period of rhythmic divine music is indeed an elevating experience to all of us. Music transcends thousands of minds bringing peace and happiness. When I see you all friends, belonging to that tradition, I salute you all.

The country has multiple organisations such as Indian Council of Cultural Relations, Sangeet Natak Akademi, and similar institutions in the State sectors and the private initiatives such as Kala Kshetra, Music Akademi, several drama and music troupes for promoting music, dance and drama. It is essential to bring the best from all parts of the country. The Sangeet Natak Academy can have the specialist team for various regions for searching the talent in the music, dance and drama, encourage the best and bring them to participate in the festivals. The aim should be to reach a larger number of people particularly the youth so that our ancient culture is preserved, nurtured and passed on to the next generation, in all its richness.

Divine compositions of Purandaradasa and Sadasiva Brahmendra continue to uplift the minds of millions even this day. When we hear Balamurali Krishna sing ‘Cetaha Sriramam’ or the Dhun of Ustad Bismillah Khan in Shehnai or when we hear Pandit Shiv Kumar Sharma’s Ragini Yamen on Santoor, it is difficult to express the joy and elevated thoughts in words. It can only be experienced and felt. Similarly, when we hear Kishori Amoankar sing “nainanu neenuu bahe” or a ballad of Bhojpuri; or Papanasam Sivan’s “Amba manam kanindhu” even if we do not follow the exact words, the rhythm captivates us.

Drama has been a great form of entertainment for invigorating the minds of people. It can be a powerful medium for messages and planting excellent imaginative thoughts for young and old. When I was in school, I have seen many dramas being enacted in the schools and even outside. This form of art has been under great pressure due to cinema, TV and multimedia, which have their own role. But we need to recapture many of our ancient drama forms, and rich traditional stories embedded in them.

I would like to explain my personal experience in native theatre of arts. During the period 1985 to 1995, quite often I used to travel by road from Bhubaneshwar to Chandipur in Balasore District of Orissa. It is a five hours drive from Bhubaneshwar airport. In this journey I would be passing through a number of villages covering at least five districts of Orissa, during the nights. During the Navratri period it used to be a beautiful scene of dance, music and drama played by village artists in front of different images of the Goddess Durga throughout this route. This used to be a great musical and happy meeting of the citizens of that area and it also generated a large number of local talents. This should be encouraged and appreciated by institutions such as Sangeet Natak Akademi.

I have briefly discussed earlier about the spreading of the classical dance, music and drama to the masses. There is another crucial problem needing urgent solution. There are many young artists from all over the country especially from smaller towns and villages. For them to pursue artistic profession even on part-time basis is a difficult job. There are many entry barriers. Sangeet Natak Akademi would need to address it urgently. Otherwise, best of the young persons who do not have patrons to promote them, may not get into artistic profession at all. If talented youth from different walks of life are facilitated to enter into art, the richness and diversity of the Indian art forms will get the much needed nourishment.

To pay tribute to the India's cultural heritage and to celebrate performing art a series of cultural programmes are organised under the auspices of "Indradhanush". The aim of "Indradhanush" is to acknowledge the contribution of the renowned as well as the young

artists. So far, we have organized eighteen such programmes. It started with the performance of Pandit Jasraj. He sang among other bhakti geets, Govind Damodar and Mero Allah Meherbaan. Some of the others who performed include Flute Maestro Pandit Hari Prasad Chaurasia, Rudra Veena by Asad Ali Khan, Saraswathi Veena by E. Gayathri and Odissi dance performance by Sonal Mansingh. Recently, a Ghazal performance by Shri Jagjit Singh was conducted. I would like to share with you my experience with two Nadaswaram Vidwans – Sheikh Mahboob Subhani and Smt. Subhani. They gave a beautiful Nadaswaram recital performance to the Rashtrapati Bhavan audience. After the recital I requested the couple to perform for the differently abled children, whenever they get an opportunity. They made it a point to perform for some of our special children in Chennai and I understand that it gave lot of happiness to these special children. This is a very noble cause and I would request the artists assembled here to follow this example whenever they get an opportunity to make the special children happy.

In addition, we have also organized several cultural programmes of young artists where, Master Abhay Goyal, an eight year old boy played Piano. Master Siddharth Nagarajan, a seven year old boy, played the drums, sixteen year old L. Athira performed violin and children of Sridevi Nrithyalaya, Chennai performed Bal Ramayan dance drama. Let us encourage our children and youth to participate in arts and culture and demonstrate their abilities which will motivate the other children to perform better in their field of expertise, and enable the nation to preserve our cultural heritage and bring about societal harmony.

I had the opportunity to witness the great exponents of music, dance and drama. The experience of listening and seeing them makes me think whether music and dance can be used as an instrument for ensuring global peace and act as a binding force. Fortunately, we have a rich civilizational heritage of more than 5000 years blending literature, music, dance and drama.

The music and dance takes you to a different plane and gives you a breeze of happiness and peace. I believe such music and dance will emanate only when the artists themselves are in peace and in a

happy state of mind. In this state they will become an elegant example of propagators of peace and happiness to the society.

Normally the peak performance of an Indian classical music needs minimum one hour. It is essential to attract the youth to this kind of musical performance through the TV advertisement clips by showing the peak musical performance as a special 'minute bulletins' to catch the imagination of the youth.

When we give these awards, I realize that we are admiring and recognizing the performance of experienced artists. In addition to this, we have to admire and nurture upcoming artists, in different parts of the country including the remote areas. At least 10 awards may be instituted for celebrating the young artists below 20 years. I suggest a special team should be deputed for spotting the artists by visiting the rural areas.

I once again congratulate the recipients of Sangeet Natak Akademi awards. My best wishes to all the members of Sangeet Natak Akademi in their mission of preserving, nurturing and promoting our traditional performing art form among the youth of the nation.

Power of Creativity

I AM DELIGHTED to be in Shillong in this beautiful environment and interact with the Shillong children. My greetings to all the students, teachers and their parents. Recently, I happened to see the prize winning paintings of the children who participated in the Shankar's International Painting Competition. The paintings reflected the beautiful minds of the children. I would like to share with you some of them.

I was very happy to see the German girl Anthea Neums bringing out her imagination of how the season of Easter looks like in the rural environment; the bright colours that she has chosen reminded me of my home town on the seashore, where I spent my childhood days. In the same book, 14 year girl Supraja Chakravarthy, from India narrates a story about the homely middle class morality and how the votes are purchased during an election. It is clear that the young mind wants a change.

Aardhra Krishna (13), has worn her thinking cap on and let her imagination fly. She has visualized how the earth will look like around 3000 AD. In her imagination, the citizens are forced to migrate to Mars and have made Mars the home to a flourishing civilization. This advanced civilization, which was man-made comes suddenly under threat created by nature in the form of an asteroid of Jupiter. The asteroid from Jupiter was coming towards Mars and Mars was in danger of extinction. The scientists on Mars come up with a very innovative plan of a barrage of nuclear cannons to attack the oncoming asteroid. The bombardment destroys the asteroid and the year 3000 sees a Martian civilization surviving from the fury of the nature by scientific innovation. What a beautiful scientific thinking of Aardhra Krishna!

I was amazed about the poem written by a 12 year old girl Anna Sinyakova from Russia – “Never think of illness”. I always believed that there will be some problem or the other while doing important tasks, but problems should not become the master. My advice particularly to the young children is that you should defeat the problem and succeed. The same thoughts are echoed by Anna Sinyakova from Russia. She sends out a very strong message of encouragement and advice through her poem that you must have the courage to face any disease to keep up the human well-being.

I liked the painting of Savidhya Kumari Premasundera, a ten year old girl from Sri Lanka. The way she has imagined the scene of the fishing and the fishermen is testimony to the alertness and the observation capability of the young mind. Kenya’s thirteen year old boy recounts his personal experience of his maiden flight which was hijacked. The entire incident had been so deeply engraved in the young mind. The boy has been very eloquent in bringing out his experiences and emotions in his write-up.

I would like to share with you some events which narrate the experiences on how to subjugate failures and succeed in our mission using creativity.

According to the Laws of Aerodynamics, the shape of the bumble bee is such that it should be impossible for it to fly. But the bee’s determination to fly is strong. The bee keeps fluttering its wings and its life propels the bee. This high frequency vibration creates a vortex which enables it to fly. With determined efforts you can always succeed against established beliefs. That is the power of creativity.

Not only was the bumble bee’s flight, even the human flight was considered impossible. In 1890, a well-known scientist, Lord Kelvin, who was the President of Royal Society of London, said that, “any thing heavier than air cannot fly, and cannot be flown”. Two decades after that, the determination of the Wright Brothers made the impossible possible and proved that man could fly. Their success is a story of how sheer perseverance and creativity could lead to success. This singular achievement has made the transportation revolution and made the world smaller.

The famous rocket designer Von Braun, built the Saturn-V to launch the capsule with astronauts and made moon walk a reality. He once said that “If I am authorized, I will remove the ‘word impossible’ from the dictionary.”

If you want to become a poet, writer or painter, you have to have a dream, and then acquire knowledge, work hard, you achieve the results as the bumble bee, as the Wright Brothers, as the famous Indian scientist Sir C.V. Raman, as the painters like M.F. Hussian, Picasso, as a painter and sculptor like Amarnath Sehgal, as a poet like Rabindranath Tagore. My dear children the future is waiting for you to enter your name along with those doyens of arts and science.

Now I would like to talk to you about the Indian Chandrayan Mission.

Prof. Vikram Sarabhai gave a mission in the 1960s on what ISRO should do. He gave us a vision — that ISRO should design, develop and launch its own rockets, that is, satellite launch vehicles. It should launch communication satellites in geosynchronous orbits and remote-sensing satellites in polar sun-synchronous orbits. Both were needed for applications — to connect people through communication satellites, provide beneficial information to people and bring about connectivity State to State, and country to country. Remote-sensing spacecraft are intended to sense, to discover some of the natural wealth, forest wealth, and help in assessing the drought and flood condition.

I can say that ISRO has successfully realized Prof. Vikram Sarabhai’s dream. What next?

Now we have the Chandrayan programme, that is, orbiting a spacecraft around the moon. ISRO may land a small scientific payload on the Moon. In future we may go for Lunar Mining which could enable man to bring back to earth shipments of Helium-3, which is reported to be abundant on the moon, as a valuable fuel for thermonuclear reactors.

Now I would like to give you a ten point Oath. Will you repeat with me ?

1. I will pursue my education or the work with dedication and I will excel in it.
2. From now onwards, I will teach at least ten persons who cannot read and write to read and write.
3. I will plant at least 10 saplings and shall ensure their growth through constant care.
4. I will visit rural and urban areas and permanently wean away at least 5 persons from addiction and gambling.
5. I will constantly endeavour to remove the pain of my suffering brethren.
6. I will not support any religious, caste or language differentiation.
7. I will be honest and endeavour to make a corruption free society.
8. I will work for becoming an enlightened citizen and make my family righteous.
9. I will always be a friend of the mentally and physically challenged and will work hard to make them feel normal, like the rest of us.
10. I will proudly celebrate the success of my country and my people.

Enriching the Society through Education

I AM INDEED delighted to be in the Mizoram University campus and interact with the students and Faculty. I take this opportunity to congratulate all the teachers, students and staff of this University and all those who have contributed in promoting excellence in educational standards of this University. Today I would like to share with you the thoughts on “Enriching the Society through Education”.

Any University is judged by the level and extent of the research work it accomplishes. This sets in a regenerative cycle of excellence. Experience of research leads to quality teaching and quality teaching imparted to the young in turn enriches the research. Research brings transformation and development and also enhances the quality of education. Both the research and teaching are being carried out in the best traditions of Mizoram University. Let me share with this important gathering on the two phase progress of science and technology in India.

In India, science and technology took a two-phase progress with the momentum created in 1930s, by the great scientists of international repute. They gave the country the confidence. We remember the pioneering contributions to science made by Chandrasekhar Subramaniam for his Chandrasekhar limit and black hole, Sir C.V. Raman for his discovery of the “Raman effect”, Srinivasa Ramanujan for his contributions towards number theory, J.C. Bose in the area of microwaves, S.N. Bose, famous for Bose-Einstein statistics and Meghnad Saha for “Thermo-Ionization Equation”. This phase, I consider the glorious phase of Indian science. The scientific foundation laid by them triggered the later generations. The unique similarities of all these scientists are that they had dedicated their entire life for the cause of scientific research and the spirit of inquiry for the fields that

Speech while Interacting with the Students and Faculty of Mizoram University, Mizoram, 24 September 2005

they have chosen amidst all the hurdles and problems in their life. Science always gives life time missions to the scientists, and then only success comes. It is a question of dedication, commitment and understanding and also the environment for research in science, which gives birth to the scientists for the nation. They inspired many later generation scientists including G.N. Ramachandran, the originator of triple-helix.

Let me now discuss on how India had built the S&T base and drew the road map leading to national development using science and technologies particularly in the field of defence, space and atomic energy in the post independent era. The science and technology had also fed critical inputs to reaching self-sufficiency in food through the Green Revolution and milk production through the White revolution.

All of you know, in history, any country revolves itself initially around a few stout and earnest knowledge giants. Particularly I took interest to study the lives of three scientists, as I was interested in their scientific technological leadership qualities that focused the relationship of S&T and development of the nation. In the history of India, there may be many but I was very close to these three great personalities for one reason or the other. They are founders of three great institutions. I worked in two of the institutions directly and one in partnership. Dr. D.S. Kothari, a Professor in Delhi University was an outstanding Physicist and also an Astrophysicist. He is well known for ionization of matter by pressure in cold compact objects like planets. This theory is complementary to thermal ionization work done by Dr. Meghnad Saha his guru. Dr. D.S. Kothari set a scientific tradition in Indian defence tasks when he became Scientific Adviser to Defence Minister in 1948; He created a Board of Advisors to the Scientific Advisor consisting of Dr. H.J. Bhaba, Dr. K.S. Krishnan and Dr. S.S. Bhatnagar. Later the Board was renamed as Scientific Advisory Board with enlarged membership.

He established the Defence Science Centre to do research in electronic material, nuclear medicine and ballistic science. He is considered as the architect of defence science in India. His race continued and followed up with momentum working and contributing

in the areas of strategic systems, electronic warfare systems, armaments and life sciences.

Now, let me discuss about Homi Jehangir Bhabha. He did research in theoretical physics in Cambridge University. During 1930-1939, Homi Bhabha carried out research relating to cosmic radiation. In 1939, he joined Sir C.V. Raman in IISc Bangalore. Later, he was asked to start the Tata Institute of Fundamental Research with focus on nuclear science, mathematical science and established Atomic Energy Commission in 1948. Multi centres were born with his vision in nuclear science to nuclear technology, nuclear power, nuclear devices and nuclear medicine. These science institutions established multi technological centres with basic science as a vital component. I am sure our nuclear scientists and technologists will add to our country 20,000 MW power by the year 2020 as the vision propounded by our Department of Atomic Energy.

Prof. Vikram Sarabhai, the youngest of the three, worked with Sir C.V. Raman in experimental cosmic ray research. Prof Sarabhai established Physical Research Laboratory (PRL) Ahmedabad with Space research as focus. PRL was the cradle of Indian Space Programme. Prof Vikram Sarabhai unfolded the space mission for India in 1970 that we should build Satellite Launch Vehicle capability, to put our communication satellites in the geo-synchronous orbit and remote sensing satellites in the polar orbit. Also, he envisaged that launch vehicles built in India should be launched from Indian soil. This one visionary thought led to intensive research and development in multiple fields of science and space technology. Many of us had the fortune to be part of Prof. Vikram Sarabhai's vision. My team and myself participated in India's first satellite launch vehicle programme to put the satellite in the orbit. Today, India with her 20,000 scientific, technological and support staff in multiple space research centres, supported by about 300 industries and academic institutions, has the capability to build any type of satellite launch vehicle to place remote sensing, communication and meteorology satellites in different orbits, and space application has become part of our daily life. Dear young friends, you have seen how visionaries of a nation bring about economic transformation and technological change.

I would like you to emulate these visionaries, dream and work for transforming India into a developed nation.

Now I would like to discuss how to nurture young talent.

I would like to narrate an incident during a function conferring Prof. Norman E Borlaug with Dr. M S Swaminathan award, at Vigyan Bhavan, New Delhi on the 15th of March 2005. Prof. Borlaug, a Nobel Laureate and a well known agricultural scientist, at the age of 91 was in the midst of all the praise showered on him from everybody gathered there. When his turn came, he got up and highlighted India's advancement in the agricultural science and production and said that the political visionary Shri C. Subramaniam and Dr. M S Swaminathan were the prime architects of First Green Revolution in India. He also recalled with pride Dr. Verghese Kurien who ushered White Revolution in India. Then the surprise came. He turned to scientists sitting in the third row, fifth row and eighth row of the audience. He identified Dr. Raja Ram, a wheat specialist, Dr S K Vasal, a maize specialist, and Dr. B. R. Barwale, a seed specialist. He said, all these scientists had contributed for our green revolution. Dr. Borlaug introduced them to the audience by asking them to stand and ensured that the audience cheered and greeted the scientists with great enthusiasm. This scene I have not witnessed in our country, so far. This action of Dr. Norman Borlaug, I call it as a Scientific Magnanimity. Young friends, if you aspire to achieve great things in life, you need Scientific Magnanimity. Think about it and correspond with me. It is my experience that great mind and great heart go together. This will motivate the scientific community and nurture team spirit. Here I am reminded of Thiruvalluvar's famous Thirukkural:

வெள்ளத் தனைய மலர்நீட்டம் மாந்தர்தம்
உள்ளத் தனைய துயர்வு

It means the right thoughts become the seeds for the great achievements.

I would suggest that a website can be created for the Mizoram University. This can become a common platform for providing

connectivity among the Faculty and students with other universities located in different parts of the country. The website can document the case studies and special achievements of the University and its members and assist new entrants for acquainting themselves with the university. You could also include provision for the students to ask questions about their specific problems connected with education, further studies, research and creation of an enterprise in different places in Mizoram.

Yesterday, I read an interesting news which all of you should be proud of. A new form of matter proposed 80 years ago by Indian physicist S.N. Bose and Albert Einstein has been trapped inside a minute storage ring by scientists at the California University who says the “blob” might hold key to new quantum physics. The scientists have created a “blob” of super cooled Bose–Einstein condensate and have kept it running in circles inside a race track two millimeters across. Now you can realize the value of work done by scientists 80 years ago and how it is useful to future scientists. This is the power of science.

Every one of us has gone through the various phases of education from childhood to profession. A scene appears in front of me. When the child is empowered by the parents, at various phases of growth, the child transforms into a responsible citizen. When the teacher is empowered with knowledge and experience, good young human beings with value systems take shape. When individual or a team is empowered with technology, transformation to higher potential for achievement is assured. When the leader of any institution empowers his or her people, leaders are born who can change the nation in multiple areas. When the women are empowered, society with stability gets assured. When the political leaders of the nation empower the people through visionary policies, the prosperity of the nation is certain. Definitely Mizoram University will give the right type of education for empowering people who have come from various walks of life.

My best wishes to all of you in your creative educational mission.

Virtual University – For Global Citizens

*“Education is a life-long journey whose
Destination expands as you travel”*

ON 27 April 2005, we had sown the first seed for the three universities to come together to move the frontiers of knowledge. Now I see, the young sapling coming out of the seed in the form of first live lecture in the virtual cyberspace. I am indeed delighted to be with you on this important occasion of the combined gathering of the families of the University of Calcutta, University of Madras and University of Mumbai. My greetings to the Vice-chancellors, members of the senates and faculties, students and other distinguished participants. Today is an important day in the annals of Indian Universities. Three of our pioneering universities have decided to work together and create a new wave of synergy amongst our educational institutions, breaking historical and geographical barriers. This trend, I am sure, will be a fore-runner for many such unification ventures amongst educational institutions to strengthen the thought that at the frontier, there are no borders.

As you are aware, the Prosperous India is powered by the national economic development, the national economic development is powered by competitiveness. The competitiveness is powered by knowledge. Knowledge is powered by science, technology and innovation. Science, technology and innovation are powered by investment rich resources. Since Universities are the reservoir of knowledge and also the prime knowledge generation centres of the nation, I would like to discuss with you about a few thoughts around the topic “At the frontier there are no borders”.

The whole purpose of education in a country like India is to develop and enhance the potential of our human resource and progressively transform it into a knowledge society. The knowledge society will be a society producing products and services that are rich in both explicit and tacit knowledge, thus creating value added products. The real capital of this knowledge society will be its knowledge workers. The society will be highly networked to create knowledge intensive environment along with enabling process to efficiently create, share, use and protect knowledge. Our education system should re-align itself at the earliest to meet the needs of the present-day challenges and be fully geared to participate in the societal transformation. The networking of these three universities is the first step towards creating the universities that could meet the demands of the knowledge era – an era that was born out of convergence of technologies and it is only natural that the human minds should also converge in the knowledge era.

When the world was moving from the industrial to information and knowledge era, we witnessed a changing pattern in the sectoral share of GDP the number of people employed in each sector. The sectoral share of Gross Domestic Product (GDP) percentage has undergone a considerable change. Contribution of agriculture to India's GDP has reduced from 39% to 22% during the period 1979 to 2004. During the same period contribution of manufacturing sector has moved up from 24% to 27% whereas the contribution from the services sector has increased from 37% to 51%. There has been considerable change in the employment pattern also. The percentage of people employed in agriculture has come down from 64% to 54%. Simultaneously, the percentage of people employed in manufacturing has gone up from 15% to 19% and in the service sector from 20% to 27%. This trend has to continue and by 2020 our employment pattern should aim at 44% in agriculture, 21% in manufacturing and 35% in service sectors. The displacement of 10% people from agriculture sector has to be facilitated through skill enabling for undertaking value added tasks in the rural enterprises so that migration to urban area is reduced. Instead of the person from the rural areas going to urban towns in search of jobs in manufacturing and services sectors, PURA (Providing

Urban Amenities in Rural Areas) facilitates creation of employment in the rural areas itself. PURA achieves this by providing physical, electronic and knowledge connectivities to a cluster of villages thereby leading to their economic connectivity and prosperity. Knowledge creation and knowledge utilisation is the key to the success of a PURA programme. Here, the Universities have to play a major role in creation and dissemination of knowledge.

I was studying different dimensions of knowledge society how will it be different from the industrial economy. In the knowledge economy the objective of a society changes from fulfilling the basic needs of all round development to empowerment. The education system instead of going by text book teaching will be promoted by creative, interactive self learning – formal and informal with focus on values, merit and quality. The workers instead of being skilled or semi-skilled will be knowledgeable self empowered flexibly skilled. The type of work instead of being structured and hardware driven will be less structured and software driven. Management style will be delegative rather than being directive. Impact on environment and ecology will be strikingly less compared to industrial economy. Finally, the economy will be knowledge driven and not industry driven. To meet these needs we require Knowledge Grid.

What the three of the oldest and prestigious universities had started should soon spread like a wildfire but with passion and engulf the entire education system both vertically and horizontally, starting from kindergarten to remote research and spreading across multiple disciplines without any concern for geographical location or the time. This has been the motivation for the nation's programmes on knowledge grid. Promoting excellence in the education system will need creation of world class educational institutions. This will involve formulation of innovative methods by which information and knowledge are accessed fast for meeting the demands of national challenges pertinent to your academic and research and development activities.

We have rich knowledge institutions but what we have to add is connectivity. This connectivity today technologically is possible but would need creation of high band width reliable network infrastructure

to the extent of minimum 10 Gigabits per second all through the country to provide uniform access of knowledge in different regions.

The connectivity must transform into a network and provide a seamless access between the knowledge creator that is the Universities and institutions, the R & D institutions that convert knowledge into products and the knowledge consumer that is the industry and people. As an example, now let us take Jatropha plantation to generation of bio-fuel. The Jatropha plantation technology and methods are provided to the farmers by the agricultural university. The R & D institutions work on converting Jatropha seeds into bio-fuel and by-products. A rural small scale industry will establish an enterprise for producing bio-fuel and marketing it. The rural development and agricultural ministry provide the policy framework for pricing and use of bio-fuel. Also, there is a need for the University to work on the development of a variety of hybrid seeds for increasing the productivity of oil from the seeds. Thus we can see there is a close cycle between the farmer, researcher, educational institutions, industry and the user requiring variety of knowledge input at different stages which can be made available effectively only if all these institutions are brought under knowledge grid and a common communication protocol with high speed access is made available to them. Connectivity is the key to success of our development programmes.

On 2nd June 2005, the Government has constituted a Knowledge Commission to deal with matters relating to institutions of knowledge production, knowledge use and knowledge dissemination. The mandate of the Commission is to sharpen India's "knowledge edge". It will also explore ways in which knowledge can be made more widely accessible in the country for maximum public benefit. Also it will advise on how India can promote excellence in the education system to meet the knowledge challenges of the 21st century. In effect the aspirations of India to become a developed nation capitalizing on its knowledge and its importance in the emerging new era, will solely depend on the contributions of the universities to the national missions.

Some of the major areas where our Universities can contribute are energy (solar, bio-fuel and Thorium Nuclear Reactor), second

green revolution for increasing the food grains output from the existing 200 million tonnes per annum to 400 million tonnes with reduced availability of land, reduced availability of water and reduced farm work force and provision of potable safe drinking water to all the citizens, energy-efficient green habitat for the citizens, enhancing our ICT export market through the development of knowledge products and develop nano-technology-based system for societal transformation. Some of the examples are energy storage, production and conversion, enhancing agricultural productivity, water treatment, disease diagnosis and screening, drug delivery system, food preservation and storage, air pollution control and ventilation, construction, health monitoring and vector / pest destruction and control.

In addition to the above, the teachers from humanities and languages are also an important component of our educational system. They give the moral, ethical, cultural and commercial values. This will protect the world from degrading towards a very cruelly materialistic one. The humanities and language experts can also carry our culture and heritage exchange through a well planned tele-education delivery system to the twenty million people of Indian origin living in different parts of the world. I am sure one day India will become the role model for creating and consuming knowledge products and still maintaining its moral, ethical and cultural value system about which many generations of humankind would be proud of. Also, they can meet the requirement of their Indology students of different countries who are keen to learn about Indian culture and Indian languages. This connectivity will enrich not only the students of the Universities but will also make them cultural ambassadors of the nation. Similarly, this collaboration can lead to unlimited growth in academic research and application activities in all the faculties such as arts and sciences, management studies, law, linguistics, history, geography, geology and other branch students.

During my recent visit to Russia I had suggested the launch of a youth satellite exclusively for use by youth of different countries. I am sure the members of the three universities assembled here would like to participate in the youth satellite programmes. In this connection, a good example is the micro satellite built by Anna University in

collaboration with ISRO. In a similar way, I suggest a common mission between these three universities can be evolved. Now I would like to discuss about virtual university.

The Association of three universities should lead to a creation of a virtual university through networking which you have already started. You have to only position the infrastructure and the modalities in place so that you can become the first operational virtual university in the country combining 450 years of accumulated academic and research strength of the three universities.

In the world which is shrinking to become a global village, it is also important to produce students who ultimately become the knowledge workers in our economy to be global citizens. In this regard, at least to start with we must be able to offer courses of predictable standards across the three universities. A student should be able to attend courses of his choice without geographical constraints. The three universities must co-sign the new degrees from this Virtual University. The day when all our universities begin to offer this flexibility and assure constant and consistent high quality, India could proclaim to be the knowledge super power.

While it is unarguable that the Virtual Universities provide us with technologies of the future and the most economic way of scaling high quality education in the country, they are no substitute to the campus-based education. The challenge to the Virtual Universities is to provide the best of breed of both the worlds. In this process, we could plan an optimum mix of direct contact hours between the students and the teachers and also amongst the students themselves. These interactions should also be used as a platform to excite the students to take to learning in the new paradigm.

In the world of Virtual Universities the equitable access to all its participants is the primary goal. Unlike in the real world, where the equitable access is always the democratic average, in the Virtual Universities the equitable access always means the equitable access to the best resources – be it the teachers, be it the library, be it the laboratory, available across the network. In effect, the network brings the best of its participants to every one of its participants.

The three phases of learning are the lectures, library and laboratories. They require increasing bandwidth from a few 100's of kilobytes for the lectures to a few megabytes for the formal digital libraries and the informal world of knowledge from the Internet, to gigabits of connectivity for remote laboratories in the world of high precision science and engineering. As the bandwidth becomes cheaper and available in abundance, universities should be able to run remote instruments and facilities as complex as NMR to Wind tunnels. This will ultimately provide equitable access to the entire education system beyond just the lectures and the lecturers. Thus the bandwidth is the demolisher of imbalances and a great leveller in the knowledge society.

At Rashtrapati Bhavan, I meet many experts from all over the world and from India, who have made the virtual universities of very high quality. At the same time, I also see in some of them a myth that many in the educational segment have started to have a wrong notion that anything connected to the web is a Virtual University. There must be a model code of evaluation and accreditation of quality Virtual Universities in the country and any impersonator must be weeded out immediately. For a nation, that has grown from maintaining quality in class room based education to distance education, this is a natural progression.

A model Virtual University, which can be emulated by others, should have some of the following characteristics:

- a) It should have a framework to identify experts of national/international eminence in specialized areas and interweave the lectures to form a common curriculum.
- b) It should be able to co-ordinate, organize, schedule and broadcast the lectures of specialists.
- c) It should record the live transmission of the lecture with interaction details in a data bank for easy access by participants for review learning.
- d) It should provide a common data exchange format and a common look and feel for all of the lectures — be it live or archived.

- e) Digitize all the university libraries and make it available for seamless access by all the universities.
- f) Enable a digital collaboration among the students and faculties of the three universities and also from outside universities for knowledge sharing, knowledge dissemination and expansion.
- g) The universities need to become teacher assisted, technology enhanced and learner centric.
- h) They should have “an always on connectivity” and must be able to provide bandwidth on demand and meet even the high bandwidth demands of immersive learning and remote experimentation using high precision expensive instruments.

I wish that with the dedication and the history of achievements of the three universities – Calcutta, Madras and Mumbai, this collaboration would lead to the creation of the high quality Virtual University that will attract the nation’s best talents and produce borderless knowledge workers who will strive to make the world a much better place to live in. The Virtual University should graduate into a modern Nalanda and attract students from all over the world – a true global village producing global citizens with borderless talents, ethics and ethos.

All this would lead to synergizing the strengths of the universities in promoting quality education to our students in a cost effective manner located in these three regions leading to academic excellence and promotion of knowledge society.

For India to be a developed nation, it is essential that there is a massive scheme for development of the rural areas, as 70% of our population lives in villages. Hence the Government has announced the introduction of a scheme called PURA, i.e. Providing Urban Amenities in Rural areas. PURA model envisages habitat design to improve the quality of life in rural areas and also removes urban congestion. It is essentially conceived around four types of connectivities with the aim to speed up process of achieving total rural prosperity. Physical connectivity enables high mobility to villagers so that they can interact and use common infrastructure such as school,

health centres and markets. The electronic connectivity with telephones and internet facilities bring them together and interact with anyone anywhere in the world. Knowledge connectivity will transform the rural area in education, health care, application of science for crop, water and forest management, environment protection and co-operative product marketing. The combination of all these three connectivities provides the economic connectivity with small-scale industries, agro and food processing, warehouses, micro power plants, renewable energy farms and banks. The four connectivities will bring prosperity to the villagers and improve quality of life. Universities of Calcutta, Madras and Mumbai can adopt 20 to 30 villages located near the metropolitan cities and create a model PURA with all the connectivities and enterprises with large scale employment generation potential.

A PURA complex each can be planned in Diamond Harbour region of West Bengal by Faquirchand College, Chengalpattu region in Tamil Nadu by Vedachalam Government Arts College and Palghar region in Thane district, Maharashtra by Sonopant Dandekar Arts, Science and Commerce College. The Universities can become facilitators by nominating the support of Departments of Management Studies, Computer Science and Information Technology, Biotechnology and Biology, Energy and other related areas of specialization for planning and executing these PURA complexes in collaboration with the Government, industries and societal transformers like NGOs. Funding can come from the Government, banks, industry, NGOs and self-help groups. The graduates and post-graduates of the University should become enterprise leaders and become employment generators rather than employment seekers in these rural enterprises. Now I would like to discuss a model PURA which is in operation in Tamil Nadu.

Last year I had visited Periyar Maniammai college of Technology for Women and inaugurated a PURA Complex. I thought of sharing with you the developmental concept of a cluster of over 65 villages near Vallam, Thanjavur district of Tamil Nadu which involves a population of 3 lakhs. This PURA complex has all the three connectivities - physical, electronic and knowledge — leading to economic connectivity. The centre of activity emanates from the women

engineering college that provides the electronic and knowledge connectivity. I understand that now five of the Periyar PURA villages have been connected with Wi-MAX connectivity. Periyar PURA has health care centres, primary to postgraduate level education and vocational training centres. This has resulted in large scale employment generation and creation of a number of entrepreneurs with the active support of 850 self-help groups. Two hundred acres of waste land has been developed into cultivable land with innovative water management schemes such as contour ponds and water sheds for storing and irrigating the fields. All the villagers are busy in either cultivation, planting *Jatropha*, herbal and medicinal plants, power generation using bio-mass, food processing and above all running marketing centres. This model has emanated independent of any government initiative. The committed leadership has been provided by the Engineering institution. This gives me the confidence that PURA is a realizable proposition and this movement can be multiplied by thousands of entrepreneurs, educational administrators and philanthropic institutions with the support of the government agencies.

In the 21st century, India needs a large number of talented youth with higher education for the task of knowledge acquisition, knowledge imparting, knowledge creation and knowledge sharing. I am working for it. At present India has 540 million youths under the age of 25 which will continuously be growing till the year 2050. Keeping this resource in mind, the Universities and educational systems should create two cadres of personnel: (1) a global cadre of skilled youth with specific knowledge of special skills (2) another global cadre of youth with higher education. These two cadres will be required not only for powering the manufacturing and services sector of India but also will be needed for fulfilling the human resource requirements of various countries. Thus, the universities will have to work towards increasing the through put of the higher education system from the existing 6% to 20% by the year 2015, 30% by the year 2020 and 50% by the year 2040. The other Indians who are not covered by the higher education system should all have world class skill sets in areas such as construction, carpentry, electrical systems, repair of mechanical systems, fashion design, para-legal, para-medical, accountancy, sales and marketing, software and hardware maintenance and service, software

quality assurance personnels etc. No Indian youth should be without either a world class higher education or without world class skill sets. This is the mission which must be undertaken by all our Universities and the educational systems particularly the consortium of the three universities namely Calcutta, Madras and Mumbai. I would like to appeal to the youth who are from these universities to create new models to make such a thing possible. We have to start right now to realize this goal since the overall time available for such an educational growth is short. A National Policy for creating a “Global Human Development Cadre for India” has to emerge. I am working for this mission.

For realizing excellence in education, what we need is quality faculty, infrastructural facility, national and international high bandwidth connectivity, availability of knowledge sources. In addition we need a good learning environment, collaborative environment, exposure to the best international practices and constant promotion of innovation and creativity. The higher the research intensity in a University environment, better will be the teaching quality. The collaboration of the three universities should provide these features to all the constituents’ colleges in different regions and become role models for the entire country in propagating attractive and high quality virtual education. Each University, its faculty members and the students must try to say “what they can give to other two universities.” The capacity building in areas of importance to the national development is a primary role of the teachers. Today science and technology are directly linked to the nation’s economic development and their sustainability is related to the applicability and relevance of education system in uplifting the 260 million people living below the poverty line and those who live in the rural and urban areas. The attitude of giving between the universities will enhance the efficiency in knowledge creation and speedy dissemination. Knowledge gets multiplied when connected and circulated. The momentum that you have given to the concept of Virtual University should soon engulf every university, school and research institutions and make the whole India connected by a Knowledge Grid. Finally I would request all faculty members of the University, each one of them to ask themselves a question “what I

would like to be remembered for during the phase of my university mission?”

I inaugurate the Virtual University formed by the consortium of three Universities, you are the societal transformers of the 21st century; you work in the cyberspace and advanced technologies and produce a visible growth in our economy in the real world. I wish you all success in your mission of promoting excellence in education and capacity building among students and finally evolving the creation of the knowledge society for the nation.

Capacity Building for Energy Independence

I AM DELIGHTED to participate in the first Convocation of the University of Petroleum and Energy Studies (UPES) in the beautiful environment of Dehradun. I greet the Vice-Chancellor, the Faculty members of UPES, the students and the distinguished guests. I am particularly happy to be with you today in this institution, which is one of the unique institutions in the country imparting education on petroleum and energy which is lifeline for all activities in the nation. I extend my congratulations to the graduating students of this University today who will be the pioneers in energy technology and energy management of the future. I was thinking what thoughts I could share with you. I have selected the topic “Capacity Building for Energy Independence”.

Energy is the lifeline of modern societies. But today, India has 17% of the world’s population, and just 0.8% of the world’s known oil and natural gas resources. We might expand the use of our coal reserves for some time and that too at a cost and with environmental challenges. The climate of the globe as a whole is changing. Our water resources are also diminishing at a faster rate. As it is said, energy and water demand will soon surely be a defining characteristic of our people’s life in the 21st century.

Energy Security rests on two principles. The first, to use the least amount of energy to provide services and cut down energy losses. The second, to secure access to all sources of energy including coal, oil and gas supplies worldwide, till the end of the fossil fuel era which is fast approaching. Simultaneously we should access technologies to provide a diverse supply of reliable, affordable and environmentally sustainable energy.

Address at the First Convocation of the University of Petroleum and Energy Studies, Dehradun, 16 October 2005

As you all know, our annual requirement of oil is 114 million tonnes. Significant part of this is consumed in the Transportation Sector. We produce only about 25 % of our total requirement. The presently known resources and future exploration of oil and gas may give mixed results. The import cost today of oil and natural gas is over Rs. 120,000 crores. Oil and gas prices are escalating; the barrel cost of oil has doubled within a year. This situation has to be combated.

Energy Security, which means ensuring that our country can supply lifeline energy to all its citizens, at affordable costs at all times, is thus a very important and significant need and is an essential step forward. But it must be considered as a transition strategy, to enable us to achieve our real goal, that is, Energy Independence or an economy which will function well with total freedom from oil, gas or coal imports. Is it possible?

Hence, Energy Independence has to be our nation's first and highest priority. We must be determined to achieve this within the next 25 years, i.e. by the year 2030. This one major, 25-year national mission must be formulated, funds guaranteed, and the leadership entrusted without delay as public-private partnerships to our younger generation, now in their 30's, as their lifetime mission in a renewed drive for nation-building.

With all our indigenous resources and international co-operation, we will be able to reach the target of 50 million tonnes within the next decade. In such a situation, the oil sector has to diversify to renewable and sustainable sources of energy. Keeping this in mind University of Petroleum and Energy Studies has to structure its course, research and academic content consistent with the national energy policy.

Vision for the oil sector, I believe, has to aim at providing to the nation at least 50% of its annual oil and gas need. Since we are dealing with fossil material resources, it may not be possible to meet this requirement fully from conventional oil exploration and extraction alone.

The only way it appears to me is that to meet the 50% oil needs, you have to go to the route of renewable energy, apart from your

further exploration of deep sea oil resources and enhancement of recovery factor. Oil sector must consider that they are in the broader business of energy and not merely oil and gas exploration. This will enable the oil sector to enter into renewable energy routes such as bio-fuel production and development of solar energy.

We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland have been allotted for tree plantation. *Jatropha* can grow well in this wasteland with very little input. Once grown the crop has fifty years of life. Fruiting can take place in this plant in two years. It yields upto five tonnes per hectares oil seeds and produces two tonnes of bio-diesel. Presently, the cost of bio-diesel through the plant is approximately Rs. 17 to Rs. 19 per litre which can be substantially reduced through choice of right size of the plant and using high yield variety plantation which has already been established by the researchers. Bio-diesel plants grown in one million hectares of land can yield a revenue of approximately Rs. 2,000 crore a year and provide employment to over one million people both for plantation and running of the extraction plants. This is a sustainable development process leading to large scale employment of rural manpower. Also, it will reduce the foreign exchange outflow paid for importing crude oil. Use of Bio-diesel is carbon neutral. This oil can also be used for soap and candle industries. De-oiled cake is a raw material for composting and plantation is good for honey production. We should absorb best of the technologies available worldwide and start commercial operation soon, instead of staying at pilot plant levels. I am happy that some of the States have already taken initiatives in having *Jatropha* plantations in waste lands. However, I also learnt that some farmers have problems in sale of their *Jatropha* produce. Immediate attention should be given by the respective State Governments to solve this problem so that those who grow *Jatropha* do not suffer.

There has been a successful experiment which has been carried out by Daimler–Benz in collaboration with CSIR laboratories of running a Benz car from Pune to Delhi using 10% blend of bio-fuel, without any modification to the engine. Now is the time for the state and central governments to come out with a policy which can provide

answers to all the questions of the farmers, financial institutions, entrepreneurs who are keen to set up the fully integrated bio-diesel plant using *Jatropha* seeds from the plantation to production of bio-diesel, by-products and their marketing. It is said that a number of foreign consultants have shown interest in taking up *Jatropha* plantation and commissioning of plants in different areas of the country. I would recommend to the University of Petroleum and Energy Studies (UPES) to take the lead and enable establishment of model bio-diesel plants with the inputs of *Jatropha* coming from different parts of the country. UPES can also undertake research in collaboration with Indian Institute of Petroleum and automobile industry for progressive increase of bio-fuel percentage in blending. Ultimate aim should be to find engines, which can run on bio-fuel alone. This will need research in automobile engines which can accept hundred per cent bio-fuel for its operation. This will enable to work for a target of realizing at least 30 million tonnes of bio-fuels within the next decade. The second area where UPES can enter in a big way is harnessing of solar energy.

India is well poised for the generation of solar energy in view of the continuous availability of sunshine throughout the year. Installation of centralized solar photovoltaic systems, which can be fed to a grid, will be a long-term economically viable solution with added benefits of pollution control. I am not unaware of the fact that India's economic growth requires addition of 500 MW installed capacity every two weeks and only the well-proven conventional technologies such as Hydro, Thermal and Nuclear Plants can fulfil this demand in the short term. But we need to think long term. Present solar cells have the efficiency of 13 to 15%. But the research effort shows that, with the advent of CNT/Polymer Composite Based Photovoltaic Cell, the efficiency of Photovoltaic cell will increase to 50%. This can pave the way for building mini 100 mega watt solar power stations in different regions of the country like Rajasthan, Andhra Pradesh, Gujarat and Tamil Nadu. UPES can design hundred megawatt captive power plants based on solar energy which can be installed in Rajasthan or Andhra Pradesh. The funding for this plant can be provided by ONGC and the respective state governments. UPES can take up indigenous research

on mission mode for producing CNT polymer composite-based photovoltaic cells with an efficiency of 50% in collaboration with other Universities, ONGC and R&D institutions.

Another area of concern emanates from possible oil spills in our ports and near our coasts. India's present demand for oil is met through import of about 85 million metric ton per annum. Hundreds of tankers are needed to meet the growing import of oil in the foreseeable future. Even if a fraction of the oil imported through these tankers spills in the Indian waters, besides posing environmental danger, there is no comprehensive response mechanism in place to deal with this threat to marine environment. An accident to even one of these very large vessels can spill up to 100,000 tonnes of oil into the Indian coastal line. India's 7500 kms coastline therefore needs to be safeguarded against ecological devastation from such oil spills.

The need of the day is to launch a mission to deal with oil spills. UPES therefore has to take a lead to find technological response to oil spills in collaboration with Indian Institute of Petroleum and Indian Universities.

I would like UPES to promote the concept of PURA (Providing Urban Amenities in Rural Area) in different oil producing zones in collaboration with ONGC. PURA envisages physical connectivity, electronic connectivity and knowledge connectivity thereby creating economic connectivity in the village clusters. For employment generation in these areas, they can plan Jatropha and bamboo plantation leading to value added product enterprises. Some of the products could be bio-fuel generation, candles, bamboo furniture based on the core competence of the particular region. They can provide knowledge connectivity to these villages through establishment of village knowledge centres connected to Kisan call centres. This type of societal mission will enable UPES to deploy the graduates from this University.

Within the next fifty years, UPES must aspire to become a pioneer in the application of alternative and sustainable sources of energy. They should explore jointly with other academic and research institutions to become a large scale provider of quality manpower required for the energy industry in India and abroad. For realizing this, UPES

should adopt multiple strategies. One of the important resources in the east and west coast is Methane Hydrate deposits, which are expected to be available at a depth ranging from 400 – 700 metres below the seabed. Seismic studies have shown high probability of existence of these deposits. This can be tapped for producing energy. High-pressure technology will be needed to enhance the gas yield. UPES must start research work in this area right now. Underground coal gasification is yet another promising area where UPES graduates can achieve leadership. In essence, I would suggest to UPES to give world leadership in quality manpower generation for exploration of energy sources, diversification of energy sources, technology in underground coal gasification and above all finding new ways of tapping energy wherever it is, to meet the ever growing demand of the country.

Once again let me congratulate the graduating students of UPES and my best wishes to the University for success in their task of creating capacities among the students who will lead India in the mission of energy independence in India.

Empowering the Indian Crafts and Weaving Sector

I AM INDEED DELIGHTED to participate in this function for presenting the National Awards for the year 2002, 2003 and 2004 to the artisans and weavers. I congratulate all the awardees for their excellent contribution in preserving, promoting and enriching the traditional and cultural heritage of our country through the unique art-forms of crafting and weaving. I am sure such recognition for the innovative and skilled workmanship of these creative persons, who have come from different parts of the country, provides an encouragement for others to work hard to bring prosperity to the handicraft and weaving sector. I would like to talk on the topic “Empowering the Indian crafts and weaving sector”.

Handicraft and handloom sector together provides livelihood for more than 12 million people in our country. Handicraft and handloom sector contributes to over four billion dollars of export and has enormous potential to provide productive employment to a large number of craft persons and weavers. There are also opportunities to create enterprises in rural, semi-urban and urban areas. However, we have to see how we can empower our craftsmen and weavers such that people will get interested in crafts work and specialized weaving work. That means we have to build capacity amongst artisans and handloom weavers through technology and training.

Some of the problems experienced by handloom weavers are the availability of yarn material and availability of the markets against the competition from power looms. The advantage for our nation is the potential of handloom sector in providing employment for a large number of people in the household and self-managed co-operative

societies spread across the country. This type of household small enterprises, I have seen in Manipur and Assam. Every member of the house weaves and wears their products. Also, if the handloom cottage industry is properly empowered, it has a potential to become a remunerative employment generator. In spite of competition from power looms, the handloom products are liked due to its unique quality, texture and uniqueness of design. Following are the suggestions for empowering the handloom sector in the country within the next five years:

- a. Creation of exclusive design centres to promote handloom products with inbuilt know-how from the fashion design centres of the country. Design centres can be established in all the regions where handloom work is predominant. Design centres can be created on the lines of Tirupur garment design centres.
- b. Generation of export and national market through proper business development practices and aggressive advertisement.
- c. Elevating the skill of the weavers and upgrading the looms and the processes taking into account the environmental needs and the international market demand.
- d. Creation of an “India brand” for handloom products through a countrywide mission mode project.
- e. Ensuring availability of the yarn material at reasonable price to the weavers. Wherever cotton is being cultivated it is better to introduce the best practices of cultivation as has been done in the Gheri Buttar in Punjab, to have a check on the cost of the yarn.

Now, I would like to share with you one experience I had on 10th December 2005.

I visited a village called Gheri Buttar near Bhatinda in Punjab, where I met the farmers who have successfully increased the production of seed cotton from 460 kg per acre to 860 kg per acre in the year 2005. This has been achieved through a productive partnership between farmers, agricultural scientists, textile industry supervisors and the

Government by following a scientific approach to farming, adopting pre-harvest and post-harvest techniques with an assured market for seed cotton. I have suggested to the farmers in that village to mount a programme of second green revolution in cotton meaning that instead of selling the cotton produce directly in the market they should convert certain quantity of cotton into yarn, cloth and apparel in the village complex itself and market it in the national and international markets. This is the only way that the income of the farmers can substantially go up.

Hence, I would like to link cotton production to yarn, cloth, leading to garment and apparel export business, which is a low investment and large volume employment generator. Two centres are well known Tirupur in Tamil Nadu and Ludhiana in Punjab for garment design to production. India is presently exporting six billion dollars worth of garments, whereas with the WTO regime in place, we should aim to enhance the production and export of apparel and garments to over 18 billion dollars by 2010. This will need intense collaboration between master weavers in the villages, NIFT, Textile Research Associations, Cotton Research Association, textile industrialists and the government. A mission mode programme should emerge. This will also be a large-scale generator of employment particularly in the rural areas. By tripling the export of apparels, we can add more than 5 million direct jobs and 7 million indirect jobs in allied sector by diversifying the handloom sector into apparel and other usages such as bandage cloth. This will give employment potential particularly for some portion of handloom weaving community and enrich the task in providing quality apparel to the national and international clientele. Concerted effort is needed in cotton research, technology generation, transfer of technology, modernization and upgrading of ginning and pressing factories and aggressive marketing strategy. NIFT can definitely assist in embedding fashion in our handloom industry so that Indian handloom products from yarn to garments carry innovative ideas for the final fashion with enhanced value. Let me now discuss about the handicrafts sector.

I had a beautiful experience of some of the art products and the men behind the products.

Some time back, Smt Jaya Jaitly who is promoting Indian crafts wrote to me about the talented carpet weaver from Bhadohi in Uttar Pradesh named Ramjeet Bind. She mentioned in her letter that Shri Ramjeet Bind has broken all the records in making finely knotted carpets. He was at that time demonstrating weaving and selling his durries at Delhi Haat. She wanted to bring Shri Ramjeet Bind to me who had woven a carpet embossed with an interesting image. I agreed to her request and on 1st January 2004 Shri Ramjeet came to me with the framed carpet specimen along with Smt Jaya Jaitly. When I saw the carpet, I was overjoyed with the craftsmanship and the realism he had brought in weaving it. I asked him how much time it took for making this carpet. He said it took nearly three to four weeks for knotting the carpets. I asked him what would be its price. He told me that it was priceless since his whole heart and soul has gone into the creation of this work. When I had a re-look at the carpet, I saw that it was really so. Such is the dedication, commitment and interest shown by many of our weavers and crafts persons engaged in dastkari work in our country. Since I am in the midst of crafts persons and artisans I thought of sharing with you this incident which really touched my heart. The second incident is about the Sirki Art.

One day a craftsman landed in Rashtrapati Bhawan and wanted to see me. I agreed. His name was Shri Mohammed Sageer Mansoori. He belonged to Kasganj, Etah (Uttar Pradesh). He said that he had a special gift of making paintings using Sirki leaves available in the forest. This gift was with him right from his early childhood. He goes to the forest, collects the leaves, presses them in a special fashion so that the insects do not attack and then he sequentially organizes the leaves on hard surface and pastes them using Fevicol or Dentroid. He showed me a few paintings which he has made including a view of the Kutub Minar which was really beautiful. He creates beautiful images and I was fully impressed with the quality of his paintings. He uses certain techniques to enhance the shelf life of his paintings which is around ten years. He told me that he normally takes around a week for completing one painting. The problem he faces is in the marketing of his paintings in the villages. He also needs help in increasing the longevity of his paintings. Both craft works are indeed

excellence in art. Let me talk to you about some of the present day architectural creations which touched my heart.

India is indeed famous for sculptors with architectural marvels. Recently I have seen two great sculptor works of architectural creations in two places. On 6th November 2005, I dedicated the Akshardham cultural complex in New Delhi. Pramukh Swamiji Maharaj has inspired thousands of people across the country and abroad and brought together the best of the minds for creating a beautiful cultural complex. It has become a place of education, experience and enlightenment. It creatively blends the traditional stone art and architecture, Indian culture and civilization, ancient values and wisdom and the best of modern media and technology. Multiple layers of this complex expresses the strength of the mind, willpower of the human being, indomitable spirit, flowering kindness, fusion of scientific and medical talent, myriad colours of varied cultures and ultimately the power of knowledge. In essence, it is a dynamic complex with lively images of 20,000 sculptures designed and made by special artisans involving 300 million man hours of work. I am also reminded of the beautiful sculptural work being done at the Kalabhairavar temple at Adhichunchanagiri. It was indeed a spiritual delight. The sculptors at work in Adhichunchanagiri had come from south India. Such architectural complexes always stand out for the excellence of Indian craftsmanship.

The work of craftspeople and artisans is the result of creativity. This creativity comes from traditional knowledge. The crafts products from this traditional knowledge are under constant attack from urban industrial and multinational products (e.g. palm leaf, coir and rubber products versus plastic products). The traditional knowledge is in isolation in rural environment. This traditional knowledge has to be integrated with technology with value addition and pro-active co-operative societies to empower craftspeople and artisans, making avenues for direct marketing/selling. Instead of craftspeople coming to urban marketing centres, the reverse phenomenon has to take place. How is it possible? I have a suggestion triggered by Visvakarma's children. I would recommend to the young graduates coming from the National Institute of Fashion Technology and Sculptors and

Architectural institutions to create small and medium enterprises in the seven thousand PURA complexes planned in different parts of the country based on the core competence of the crafts people available locally in each of the PURA complexes. This will enable preservation of our traditional knowledge and also promotion of products at an attractive price in the national and international market through value addition. Marketing has to be arranged through internet and exhibitions in marketing complexes such as Delhi Haat.

When we look at our civilizational heritage, it is an integrated history of culture, people's way of living in various parts of the country and the evolution of an integrated Indian society. Since I am in the midst of a powerful creative audience I would like to share a thought with you. This thought I got, after visiting the Ajanta and Ellora caves, Mahabalipuram Pallava sculpture and many of our ancient temples which have preserved the very important sculptures and paintings without the names of the source and the date on which it was created. The history of some of our civilizational heritage, paintings and sculpture which are misplaced is to be recreated. I would suggest that the Ministry of Textile in collaboration with the Ministry of Culture and many art lovers and crafts persons take up the mission of creating a Heritage Cave in the hill region in the backdrop of mountains. In this cave, 5000 years of our cultural heritage, paintings and sculpture should be recreated with the knowledge base available in literature and with cultural historians. It could be a mission for the decade for all our best crafts persons in the country who can create the paintings and sculpture of yesterday, today and tomorrow. This Heritage Cave should be the place where the past meets the present and creates the future. This will definitely become a place of attraction for all the national and international tourists including researchers of art and culture.

Once again let me congratulate all the award winners and my best wishes to all the crafts persons and weavers in their mission of enriching our culture and creating value added products for the society.

Bihar Vision – Developed State by 2015

I AM INDEED delighted to participate in the Annual Convocation 2005 of the Patna University. I take this opportunity to congratulate the University students for their academic performance. I greet the Chancellor, Vice-Chancellor, professors and staff for their contribution in shaping young minds to work for the nation in multiple fields. I am happy to note that this University has contributed substantially in the development of higher education in Bihar over the last nine decades. I understand Patna University has produced a number of brilliant academicians, technocrats, administrators, doctors, and social workers of eminence. The Patna University has the distinction of having its alumni important personalities like Mr. Hasan Imam, Dr. Rajendra Prasad and also the present Chief Minister Shri Nitish Kumar. I would like to discuss on the topic “Capacity Building for Entrepreneurship”.

For the nation to develop, all the States have to develop. Bihar has an important role to play in realizing this vision. We have to look ahead with confidence and set our sights high to make Bihar the leading example of resilience, growth, modernity and collective achievement. I am personally optimistic about Bihar’s success in negotiating the path of high growth especially because of the superior quality of human capital that the State is endowed with. This human capital is spread in many parts of the country and contributing in administration, management and agricultural farming. From this we see that the core competence of Bihar in multiple areas is available in Bihar for transformation of the State into a developed State. How can Patna University empower the young people of Bihar through its educational system? Capacity building with national development tasks in mind should be the focus of the educational system.

A good educational model is the need of the hour to ensure that the students grow to contribute towards the economic growth of a

nation. Can we sow the seeds of capacity building among the students? There will be continuous innovation during the learning process. To realize this, special capacities are required to be built in the education system for nurturing the students. The capacities which are required to be built are research and enquiry, creativity and innovation, use of high technology, entrepreneurial and moral leadership.

The 21st century is about the management of all the knowledge and information we have generated and the value addition we bring to it. We must give our students the skills with which they find a way through the sea of knowledge that we have created and continue with life long learning. Today, we have the ability, through technology, to really and truly teach ourselves to become the life-long learners. This is required for sustained economic development.

The management of knowledge in the 21st century is beyond the capacity of a single individual. The amount of information that we have around is overwhelming. The management of knowledge therefore must move out of the realm of the individual and shift into the realm of the networked groups. The students must learn how to manage knowledge collectively. When the information is networked the power and utility of the information grows as square as stated by Metcalfe's law. Information that is static does not grow. In the new digital economy information that is circulated creates innovation and contributes to national wealth.

Every student in our colleges should learn to know how to use the latest technologies for aiding their learning process. Universities should equip themselves with adequate computing equipment, laboratory equipment, and Internet facilities and provide an environment for the students to enhance their learning ability. In the midst of all of the technological innovations and revolutions we cannot think that the role of the teachers will be diminished. In fact the teacher will become even more important and the whole world of education will become teacher-assisted and would help in "tele-porting" the best teacher to every nook and corner of the country and propagate the knowledge.

The aptitude for entrepreneurship should be cultivated right from the beginning and in the university environment. We must teach our students to take calculated risks for the sake of larger gain, but within the ethos of good business. They should also cultivate a disposition to do things right. This capacity will enable them to take up challenging tasks later.

Moral leadership involves two aspects. First it requires the ability to have compelling and powerful dreams or visions of human betterment. Moral leadership requires a disposition to do the right thing and influence others also to do right things.

In sum, inquiry, creativity, technology, entrepreneurial and moral leadership are the five capacities required to be built through the education process. If we develop in all our students these five capacities, we will produce “Autonomous Learner” a self-directed, self-controlled, lifelong learner who will have the capacity to both respect authority and at the same time is capable of questioning authority in an appropriate manner. These are the leaders who would work together as a “Self-organizing Network” and transform any State as a prosperous State. The most important part of the education is to imbibe the confidence among the students in the spirit of “we can do it”. These capacities will enable the students to meet the challenges of our national mission of transforming the nation into a developed country by 2020.

Any University is judged by the level and extent of the research work it accomplishes. This sets in a regenerative cycle of excellence. Experience of research leads to quality teaching and quality teaching imparted to the young in turn enriches the research. Research brings transformation and development and also enhances the quality of education.

Technology is the non-linear tool available to humanity, which can affect fundamental changes in the ground rules of economic competitiveness. Science is linked to technology through applications. Technology is linked to economy and environment through manufacture of knowledge products. Economy and environment are linked to technology, which promotes prosperity to the society. We have to

use innovation to generate high value added products for becoming a global player. The research areas of the Patna University must be linked to the priorities of the State and the nation.

The most important sectors for sustainable national development are agriculture, education, health care, water and energy. One of the ways by which the rural agriculturists could increase their earnings is by value adding to the agricultural produce by processing and manufacturing. The farmers, either individually or through their co-operatives would market processed and value added items instead of marketing the raw materials. This increase in the value-addition taking place in the rural area itself is an indicator of the society moving towards prosperity and knowledge era.

Dear graduating students, now you will be entering into the real world of opportunities where you can be the employment generators as discussed above through the capacity built in you by the university system. There are five areas relevant to Bihar which I would like to highlight on entrepreneurship and employment.

We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland have been allotted for tree plantation. Certain multi-purpose bio-fuel plants can grow well in wasteland with very minimum input. Once cultivated, the crop has fifty years of life. Fruiting can take place in these plants in two years.

Bio-fuel plants grown in parts of the waste land, for example, 11 million hectares, can yield a revenue of approximately Rs. 20,000 crore a year and provide employment to over 12 million people both for plantation and running of the extraction plants. It will reduce the foreign exchange outflow paid for importing crude oil, the cost of which is continuously rising in the international market. The bio-fuel is carbon neutral and emission free. The oil can also be used for soap and in candle industries. De-oiled cake is a raw material for composting and the plantation is also good for honey production. We should absorb the best of the technologies available worldwide and start commercial

operation immediately. One time investment needed for bio-fuel plantation to production in 11 million hectares will be approximately Rs. 27,000 crores. The capital equipment and investment in plant and machinery can come from bank loans and private sector entrepreneurs. I have seen the progress in bio-fuel plant cultivation, preparation of seedlings, tissue culture and development of non-toxic hybrid varieties in Tamil Nadu Agricultural University, Coimbatore. They have also worked from processing of seeds to bio-fuel production by the indigenous design and development of bio-fuel plants. Anand Agriculture University at Anand (Gujarat) has also made progress in the bio-fuel cultivation and processing in Gujarat. Bio-fuel plants can be grown in a number of States in the southern, western and central parts of the country. The Patna University can prepare a plan for Jatropha plantation in the wasteland available in various districts and also evolve a scheme for creation of bio-fuel enterprises in the rural areas in Bihar. I would recommend that use of chour land in Bihar may be considered for Jatropha plantation. Now I would like to talk about water harvesting.

Water harvesting should become mandatory for all. To improve water table, we need to build check dams, develop water sheds, desilt ponds and rivers, clear the inlets and outlets to the ponds and water bodies and recharge the wells. If our rural areas are made to have the operational water bodies, recharging of the wells will take place. The task is totally labour intensive and nationwide implementation of this scheme will provide employment for six million persons for more than three or four years. The scheme will result in increase in storage capacity of water bodies and create additional irrigation potential of the land in the region and enhance agricultural productivity. This is particularly applicable for Bihar to prevent flooding in certain low lying areas. The next important area is wealth generation through fly ash.

As you are aware, the use of coal for power generation results in increased quantum of fly ash production, which has reached about 100 million tonnes per year. All-out efforts are needed to utilize this fly ash not only from environmental considerations, but also to avoid

land usage for fly ash dumping. Though there has been a steady progress in fly ash utilization from 1990, we have a long way to go to reach the target of 100% fly ash utilization. It is reported that the agricultural increase of grains is around 15%, green vegetables 35% and root vegetables 50%, when fly ash is mixed with the soil. Toxicity tests have proved that there is no toxic element due to fly ash. But it has higher nutrients due to increased availability of iron and calcium. The fly ash can become a wealth generator by making use of it for producing “green building” materials, road, agriculture etc. Presently, the fly ash utilization is in the range of 33 million tonnes per year and providing employment for over 50,000 personnel. Full utilization of the fly ash stock will provide employment potential for 300,000 people and result in a business volume of over Rs. 4,000 crore. Since a number of thermal power stations are in operation in Bihar, plenty of unused fly ash is available in the State. The fly ash with certain processing can be utilized by the farmers in the State for improving the soil productivity in addition to its use in cement and green building industry. The next topic I would like to discuss is Textile Industry.

Textile industry is very important for the Indian economy. Garment export business is a low investment and large volume employment generator. India is presently exporting six billion dollars worth of garments, whereas with the WTO regime in place, we can increase the production and export of garments to 18 to 20 billion dollars within the next five years. This will enable generation of employment in general and in rural areas in particular. By tripling the export of apparels, we can add more than 5 million direct jobs and 7 million indirect jobs in allied sectors, including cultivation of cotton. Concerted effort is needed in cotton research, technology generation, transfer of technology, modernization and upgrading of ginning and pressing factories and aggressive marketing strategy. I would suggest Bihar should undertake creation of a large number of apparel parks in the rural areas in collaboration with garment exporters. This will provide large scale entrepreneurial and employment opportunities to the rural population. This employment, supported by agriculture, will increase the earning capacity of the rural people of Bihar. Finally, I would like to discuss about health care.

Another area, which is an employment generator, is the health care industry. We have only one doctor for 1,800 people, whereas in some of the developed countries the doctor to population ratio is 1: 600. For providing quality health care to all of our citizens, we would need at least doubling the strength of doctors and paramedical staff in the whole country. The investment for this need not necessarily come from government alone. Hospitals can be set up by the private sector with certain tax concessions and subsidized infrastructural support.

Setting up of 30,000 static tele-medicine stations distributed in 30,000 key locations, within the zone of 3 lakh villages and providing 20,000 mobile tele-medicine units will enable reaching of quality health care closer to every home, which are connected to the district, state government hospitals, corporate hospitals, and super specialty hospitals in the country. This is possible as India has a network of satellite communication.

How to reach health care to the large number of our population? An innovative method has come into action in certain states. This system provides free health cover to the citizens who are members and pay Rs. 10 per individual per month as an insurance premium. State and Central Governments can sponsor this insurance scheme involving matching contribution of Rs. 10 per individual per month. Such a cover should be able to provide treatment for all types of diseases including expensive open heart surgery to the members of the scheme. A consortium is required to be formed, in Bihar between the Government, corporate hospitals and NGO's for providing integrated cost effective health care. The scheme when fully operational can provide direct employment for additional 48,000 doctors and one lakh paramedical staff in Bihar. Apart from providing health care to citizens, these corporate hospitals can attract a large number of medical tourists to the state in view of our competitiveness in treating complex diseases. Bihar can definitely consider setting up of corporate hospitals in the urban and rural areas backed up with the health care scheme which I have suggested. Recently, when I was in Kerala I saw a high tech hospital in a village called Parumala where facilities exist for treatment

of cardiac diseases, cancer, TB etc. Next topic I would like to cover is small scale enterprises.

Presently the small scale sector in the country has 12 million units employing around 28 million people. Bihar has certain core-competence in the areas of handloom, paper products, Madhubani paintings, makhana, sugarcane, and pisciculture. Bihar also produces guava, mango and leechi. These are fit candidates for agro-processing industry, including intermediate cold storage sites. In some areas stone cutting is a big industry. There is a need to produce value added stones for the export market. In addition competence can also be created in the areas of electrical, mechanical, chemical, computer accessories, computer hardware and software. The creation of such small scale industries in the region can provide employment for over two million youth of the state.

Dear friends, I talked to you so far about Bihar's unique core competence in various sectors and the necessity of building capacities among students for undertaking nation building tasks through the university education system. I have found that when the students graduate approximately 10% of the students take up research or some specialization. The remaining 90% graduates are looking for jobs and they have to come out with the spirit "I can do it". The education system should inspire the young to achieve this capacity. Graduates with such a prepared mind can definitely be able to take up the leadership of small enterprises with the assistance of venture capital provided by banks. This will enable the nation to have a number of employment generators rather than employment seekers. It is important for the new Bihar to make appropriate changes to the university education system which will empower the young people of Bihar to take up an entrepreneurial career.

It is time that we all realized that crime does not pay; that corruption does not pay. This only fragments the society and the economy becomes directionless. What is needed is a total realization that the situation can be retrieved and one could look to a bright future. But then it needs a vision and a collective will that can be put into practice through co-ordinated, purposeful and positive endeavours. It is time Bihar

had a vision, “Bihar Vision: Developed State by 2015”. We should learn to look into the future, set objectives for the long run and eschew all temporary, shortsighted and parochial tendencies and objectives. The people of Bihar need to rise and be awake and I have no doubt the rest of the nation will join them in such a noble task. This will be possible if the people’s welfare is put as the basic objective. Politically, socially, economically and culturally, a co-ordinated, streamlined, harmonious vision for the future need to be spelt out and worked for. I would urge all of you to work for such an objective with a vision. In this noble but mammoth task, the educated younger generation has a crucial role to play and I have no doubt your concerted action will bring back the glory to Bihar in all its sectors that it used to pride itself in.

I congratulate the graduates who are passing out from Patna University today and my best wishes to the members of Patna University for success in their mission of providing quality education to the youth of Bihar.

5

Science and Technology

Hydrography and its Multidimensions

I AM DELIGHTED to participate in the Golden Jubilee Celebrations of the National Hydrographic Office. My greetings to all the officers and staff of this office who have been working on executing the vital task of systematically conducting hydrographic surveys, nautical charts and maritime safety maps in the sea areas surrounding India. I have been informed that over the years our entire coastline of around 7000 kms have been surveyed by the team of National Surveyors resulting in the creation of valuable database. This includes a number of ports, harbours, the island territories and their approaches. The nautical charts and allied publications produced by NHO have been of immense use in ensuring safe navigation at sea and also useful in the design of offshore and coastal development projects.

As you are aware oceans are extremely important for the social, political and economic development of a nation. Oceans possess living and non-living resources. Poly-metallic nodules in deep waters, placer deposits, heavy sands containing molybdenum and thorium, deposits of phosphorites and calcite etc. are a few examples of non-living resources. Efforts are being made to locate hydrocarbon resources in deep waters. One of the important resources in the east and west coasts is methane hydrate deposits, which are expected to be available at a depth ranging from 400 – 700 metres below the seabed. Seismic studies have shown high probability of existence of these deposits. At present there is a National Gas Hydrates Programme, which is working in an integrated mission to locate methane hydrate deposits. It is a complex technological challenge as it involves high pressure technology transportation. NHO can participate in this programme by providing bathymetric or any mapping process and sound ranging support for precise detection of the deposit areas.

Efficient management of ocean resources and conduct of trade through sea route are wholly dependent on continued availability of updated reliable hydrographic data. This is where accurate and detailed nautical charts are important for economic development. Presently a new type of demand for sea water is emerging through the establishment of large scale desalination plants for meeting the drinking water shortage of a few large cities of our country. Thus, I see a very important role for NHO in promoting sustainable development both at the sea and in our exclusive economic zone and along the ecologically fragile coastal zone and island territories.

There are a few inhabited and large number of uninhabited islands of India in the Bay of Bengal and Arabian Sea. There is a need to continuously update our island boundaries and their dynamically changing contents. These islands can be characterized into three types : (1) Islands of strategic importance, (2) Islands of economic importance, and (3) Bio-diversity islands; and any combination of the above three. At this point, I would like to recall my own experience.

In October 1993, the development of Prithvi missile was almost over. However, the Army desired to have a confirmatory test, on a land range, to validate Circular Error Probability (CEP). Our efforts to conduct the tests in our desert range could not take off due to range safety problems. To overcome this we were looking for an uninhabited island on the eastern coast. On the hydrographic map supplied by the Navy, we saw a few islands in the Bay of Bengal off Dhamra (Orissa coast) indicating that there was some landmass. Our range team consisting of Dr. S.K. Salwan and Shri V.K. Saraswat hired a boat from Dhamra and went in search of the island. On the map these islands were marked as 'long wheeler', 'coconut wheeler' and 'small wheeler'. The team carried a directional compass and proceeded on the journey. They lost their way and could not locate the Wheeler Island. Fortunately, they met a few fishing boats and asked them for the route. The fishermen did not know about the Wheeler Island but they said there was an Island called 'Chandrachood'. They thought that this could be the Wheeler Island. They approximately gave the direction for proceeding to Chandrachood. With this help the team could reach the Chandrachood Island, which was later confirmed as

Small Wheeler Island. By this time it was late in the evening and it was dark.

The boatman refused to move in the night and the team had to stay in the Small Wheeler Island in the boat for the night. Next morning the team came back to Dhamra. On physical survey of the three Islands it was found that the Long Wheeler Island had eroded over a period of time and was not useful for range activities. In view of this we chose Small Wheeler, which had adequate width and length required for range operations. The team also found some signs of boats from other countries visiting the Small Wheeler Island. A study of the hydrographic data a of number of years indicated the erosion characteristic of the island. After taking over the islands from the Orissa Government for range activities, we created permanent bunds on the periphery of the selected island to prevent future erosion. This one tiny island has transformed into a world class missile range complex. Hence, every island of ours needs periodical survey and based on this survey, we have to protect our islands.

The survey of islands of economic importance should lead to the development of certain islands for promoting tourism. Once the tourism potential is established, it would need development of the tourist infrastructure to enable functioning as a wealth generator for the nation. Also there will be a need for advising the tourism department on perimeter protection of these islands to ensure prevention of erosion leading to sustainable tourism development. This we have done in the Wheeler Island complex, otherwise the useful area would have been reduced.

There are certain small islands which have inherent biodiversity potential that have to be further developed. These islands must be separately surveyed and the soil characteristics should be established for their suitability of developing certain species of herbs and medicinal plants. The biodiversity parks could be specifically used for growing the rare herbal species of Indian origin. These parks can also be developed for ecological and tourist importance. A unique forest can be developed in uninhabited islands. For example, the Andaman Padauk wood is well known as a structural material. I used it for the propellers

of hovercraft. Constant updation of hydrographic data by NHO is essential for preserving the flora and fauna of the islands.

I am delighted to know that the contribution of NHO has increased fourfold during the last 50 years in the area of sea mapping and other tasks. This has been achieved through the use of state-of-the-art surveying system such as multi-beam swath eco-sounder, digital site scan sonar, differential global positioning systems, utilization of aerial photographs and satellite imagery and transition from manual to digital data logging.

Some of the notable achievements in shipping, port and waterway development include the survey, demonstration and charting of the deep water route in the Gulf of Kutch enabling movement of crude oil petroleum products vessel from multiple Indian ports. Also, you have contributed in the establishment of nine sea ports through your hydrographic survey, and many more you will contribute in the years to come.

The United Nations Convention on the Law of the Sea (UNCLOS) was enacted in 1994 and it was ratified by India in June 1995. This has resulted in the addition of 2 million square kilometres of sea area to our national jurisdiction in the form of exclusive economic zone with full rights for economic exploitation. For claiming this additional area NHO has made important contribution in the form of providing survey data. There is a need to frame rules for governance and regulation of the development activities within the maritime zones of India consistent with national security needs. We have to map our maritime zones with its living and non-living resources as a first step towards sustained economic development in the sea areas. Department of Ocean Development, Surveyor General of India and NHO may have to work together in evolving a national plan for implementing this economic development.

Accidents at sea could have devastating impact on the environment cutting across national frontiers and national economy. Navigational safety at sea therefore calls for international co-operation for its success. At the grass-roots level this implies easy availability of authentic hydrographic data products and services to all mariners and other

users of this data. Hence, for protecting our territory and its surrounding environment we should ensure collection and dissemination of reliable hydrographic data in our own sea areas and also our maritime neighbourhood. Such hydrographic co-operation can be achieved only through Government-to-Government level pro-active measures.

One major problem in the sea is the oil slick caused due to spillage from tankers and ship accidents. The slick can cause substantial damage to the living and non-living wealth of the seas. The Hydrographic Office should carry out periodic survey of the ocean to determine the existence of slick on and under the surface. This information should be provided to marine biologists for selecting and administering oil eating or oil degrading microbes having particular affinity for consuming hydrocarbon based products. This is essential for conserving the living and non-living resources of our seas.

I am happy to note that the National Hydrographic Office has assimilated the new hydrographic technologies and techniques. They have constantly trained the personnel and kept them updated with the latest knowledge in the field. This has enabled the department to meet the variety of demands of maritime development of our nation. To further enhance the technological capabilities, NHO may undertake measurement of direct acoustic parameters such as acoustic transmission loss and ambient noise reverberation in addition to the measurement of ocean depth, type of sea bottom, temperature and salinity. Simultaneously we should also enhance our hydrographic co-operation in the region between the littoral States by exchanging hydrographic information so that a data-base of various countries on seas is generated as part of international co-operation on the sea route and sea safety.

The future vision for NHO lies in establishing multi-capability Indian Navy Surveying Ships for wider development role, innovation in surveying procedure based on the new generation census, five-yearly update surveys for ports approaches and ecologically sensitive areas and supply of updated editions of digital navigation charts using print on demand technology through online marketing.

Today, expertise, infrastructure and data collection platforms are widely distributed under different organizations such as National

Institute of Oceanography (NIO), Geological survey of India (GSI), National Institute of Ocean technology (NIOT), Fisheries Survey of India, Oil and Natural Gas Corporation, Naval Physical and Oceanographic Laboratory etc. There is a need to have an integrated approach among all participating organizations to promote ocean safety and ocean development. NHO can play an important role in achieving this due to its long-standing experience in the area and international exposure. This will enable cost-effective quality data collection and dissemination with minimum infrastructure.

When I was talking to sea port authorities, I was told that large ships above 1 lakh tonne capacity do not visit Indian ports due to lower draught (12 to 14 metres), whereas these ships need 18 to 22 metres draught. I was told, Singapore and Colombo have this natural draught availability and through hydrographic survey, they maintain this draught availability continuously by suitable dredging. I find that for the available 7000 kms of coast line, we do not have deeper draught availability conditions in any of our ports. I would like NHO to consider this as a national task and locate an area where such draught in our coast line is available or can be made available for berthing high tonnage capacity ships, which could be a large wealth generator for the nation.

On the occasion of Golden Jubilee celebrations, I wish the members of National Hydrographic Office community success in all their future missions.

Aim Great Missions, Work for Them

I AM INDEED delighted to participate in the twenty-first Convocation of the Sambalpur University. When I am in Sambalpur I realize I am in the land of the renowned freedom fighter Surendra Sai of western Orissa. Of course based on the selfless services of many leaders from 1857 to 1947 we got our independence and now we are on a mission of transforming India into a prosperous, happy and safe nation.

Sambalpur University was established with the mission of providing higher education to the tribal and socially and economically backward students from western Orissa. I am happy to know that in the last two decades, the enrolment of students from weaker section of the society has increased to 25% of the total student strength. Since I am in the academic ambience with teachers and students I would like to share my experience with a unique teacher whom I met in my early phase of life which really changed my mission in life.

I worked in Delhi with the Ministry of Defence. Later I joined Defence Research and Development Organisation (DRDO) in 1958 at Aeronautical Development Establishment in Bangalore (Bangaluru). There, I took up the development of Hovercraft. Hovercraft design needed the development of a ducted contra-rotating propeller for creating a smooth flow balancing the torques. I did not know how to design a contra-rotating propeller though I knew how to design a conventional propeller. Some of my friends told me that I could approach Prof. Satish Dhawan of Indian Institute of Science, who was well known for his aeronautical research, for help in designing the ducted contra-rotating propeller.

I took permission from my Director Dr. Mediratta and went to Prof. Satish Dhawan who was sitting in a small room in Indian Institute

of Science with lots of books in the background and a blackboard on the wall. Prof. Satish Dhawan asked me what was the problem that I would like to discuss. I explained the problem to Prof. Dhawan about my project work. He told me that it is really a challenging task and he would teach me the design if I attend his classes in IISc between 2.00 p.m. to 3.00 p.m. on all Saturdays for the next six weeks. He was a visionary teacher. He prepared the schedule for the entire course and wrote it on the black board. He also gave me the reference material and books I should read before I start attending the course. I considered this as a great opportunity and I started attending the discussion and started meeting him regularly. Before commencing each meeting, he would ask critical questions and assess my understanding of the subject. That was for the first time that I realized how a good teacher prepares himself for teaching with meticulous planning and prepares the student for acquisition of knowledge. This process continued for the next six weeks. I got the capability for designing the contra-rotating propeller. Prof. Dhawan told me that I am ready for developing the contra-rotating propeller for a given hovercraft configuration. That was the time I realized that Prof. Satish Dhawan was not only a teacher but also a fantastic development engineer of aeronautical systems.

Later during the critical phases of testing Professor Dhawan was with me to witness the test and found solutions to the problems. After reaching the smooth test phase, contra-rotating propeller went through 50 hours of continuous testing. Prof. Satish Dhawan witnessed the test himself and congratulated me. That was a great day for me when I saw the contra-rotating propeller designed by my team performing to the mission requirement in the hovercraft. However, at that time, I did not realize that Prof. Satish Dhawan would become the Chairman of Indian Space Research Organisation (ISRO) and that I would get the opportunity to work with him as a Project Director in the development of first satellite launch vehicle SLV-3 for injecting the Rohini Satellite into the orbit. Nature has its own way to link the student's dream and the real life later.

Design of contra-rotating propeller was the first project in my career which gave me the confidence to design many complex aerospace

systems in future. The hovercraft could fly just above the ground level carrying two passengers. I was the first pilot for this hovercraft and I could control and manoeuvre the vehicle in any direction. Through this project I learnt the techniques of designing and developing the contra-rotating propeller. Above all, I learnt that in a project, problems will always crop up; we should not allow problems to be our masters but we should defeat the problems. The lessons that I learnt from Prof. Satish Dhawan for the next four decades are: the importance of design capability and the need for indomitable spirit. Let me pray for you, all the young, to gain the experience what I experienced.

When I see you all in this campus during this Convocation, I realize the importance of employment generation. There has been substantial growth in our educational system and we are generating over 3 million graduates every year and another 7 million educated upto 10 or 10+2 level. However, our employment generation system is not in a position to absorb the graduates passing out from the universities leading to increase in educated unemployed, year after year. This situation will lead to instability in the social structure. We need education integrated with an entrepreneurial spirit. A multi pronged strategy is needed to make education more attractive and simultaneously create employment potential – how do we do that?

Firstly, the educational system should highlight the importance of entrepreneurship and prepare the students right from the school and college education to get oriented towards setting up of the enterprises which will provide them creativity, freedom and ability to generate wealth. Apart from entrepreneurship, the youth should have the spirit that “we can do it”. Secondly, the banking system should provide venture capital right from every village level to the prospective entrepreneurs for undertaking new enterprises. Banks have to be proactive to support the innovative products for enabling wealth generation by young entrepreneurs by setting aside the “conventional tangible asset syndrome”. Definitely this involves a certain amount of calculated risk which can be eliminated by making an analysis of successful venture capital enterprises. Thirdly, there is a need to identify marketable products and enhancement of purchasing power among

the people. This can come through the implementation of mega programmes such as rural prosperity through connectivity (RUPCON), Interlinking of Rivers, Infrastructure missions, Power missions and Tourism.

The universities should become a facilitator for creating this entrepreneurship scheme through the support of the banking system and the marketing system. This is one way of reducing the employment gap leading to upliftment of the 260 million people living below the poverty line.

I was working in India's missile programme during 1982 to 1999. Even though my place of work was Hyderabad, my theatre of action was always Chandipur and Wheeler Islands of Orissa coast where the developed missiles were flight tested. I would like to narrate an interesting experience which happened during that period.

In October 1993, the development of Prithvi missile was almost over. However, the Army desired to have a confirmatory test, on a land range, to validate the Circular Error Probability (CEP) of the missile. Our efforts to conduct the tests in our desert range could not take off due to range safety problems. To overcome this we were looking for an uninhabited island on the eastern coast. On the hydrographic map supplied by the Navy, we saw a few islands in the Bay of Bengal off Dhamra (Orissa coast) indicating that there was some landmass. Our range team consisting of Dr. S.K. Salwan and Shri V.K. Saraswat hired a boat from Dhamra and went in search of the island. On the map these islands were marked as 'long wheeler', 'coconut wheeler' and 'small wheeler'. The team carried a directional compass and proceeded on the journey. They lost their way and could not locate the Wheeler Island. Fortunately, they met a few fishing boats and asked them for the route. The fishermen did not know about the Wheeler Island but they said there was an Island called 'Chandrachood'. They thought that this could be the Wheeler Island. They approximately gave the direction for proceeding to Chandrachood. With this help the team could reach the Chandrachood Island, which was later confirmed as Small Wheeler Island. By this time it was late in the evening and it was dark.

The boatman refused to move in the night and the team had to stay in the Small Wheeler Island in the boat for the night counting the stars. Next morning the team came back to Dhamra. On physical survey of the three Islands it was found that the Long Wheeler Island had eroded over a period of time and was not useful for range activities. In view of this we chose Small Wheeler, which had adequate width and length required for range operations. The team also found some signs of boats from other countries visiting the Small Wheeler Island. A study of the hydrographic data of a number of years indicated the erosion characteristic of the island. After taking over the islands from the Orissa Government for range activities, we created permanent stony bunds on the periphery of the selected islands to prevent future erosion. This one tiny island has been transformed into a world class missile range complex. Dear friends, what we learn from this experience is: aim great missions, work for them and you will achieve.

Western Orissa is bestowed with rich tropical forest resource and it is the storehouse of medicinal plants in the Gandhamardan hill areas. Also I understand that Sambalpur University has a well equipped life science department and many others. A nation's strength predominantly resides in its natural and human resources. In natural resources, India is endowed with a vast coast-line with marine resources. India ranks among the top few nations having a rich bio-diversity. Particularly, in the herbal area there are potential applications for developing multiple products for nutrition, prevention and cure of diseases. There are tremendous opportunities for growth in global market of herbal products. India has similar potential for promoting floriculture and aquaculture in a big way. India is rich in herbs, germ plasm and micro organisms. Industrially developed countries are importing these bio-resources in the raw forms and add value to them for export to developing countries including India as special seeds, medicines and bio-materials, fully protecting patents of these products. Instead of allowing export of such resources and importing value added products at high cost, India must add its own technology for conversion of such resources into value added products for domestic requirement and also for export. Use of IT for commercialization and marketing can increase our outreach and speed enormously. Ancient knowledge

is a unique resource of India, for it has the treasure of more than 5000 years of civilization. In Rashtrapati Bhavan a herbal garden has been developed with 32 varieties of plants particularly Geranium, Sadabahar and Sarpagandha, which attracts a large number of young researchers, farmers, small scale entrepreneurs, industrialists and students.

I will be inaugurating a herbal garden in this university campus and I am sure this garden will lead to the growth of many new varieties of herbal plants. This will also enable the university to build capability of converting plant extract to drug in partnership with research laboratories and the drug industry.

I have discussed with you my experiences with a design teacher, employment generation through entrepreneurship, an island transforming into a launch complex and wealth generation through bio-diversity. These experiences emphasise the importance of indomitable spirit in realizing any mission leading to progress of individuals.

Development is dynamic; it is a vibrant continuum; it is a multi-faceted phenomenon. It is essential to grasp the real concept of development to ensure holistic growth and full realization of goals. As we move towards the development of Orissa with economic strength, competitiveness, knowledge power and technology, productivity needs, effective governance and empowered management, we also need invisible leadership. Invisible leaders are those whose leadership styles move from commander to coach, manager to mentor, from director to delegator and from one who demands respect to one who facilitates self respect. I would recommend to Sambalpur University to create such leaders who will shape Orissa into one of the leaders in economic development.

Technology for Societal Transformation

I AM INDEED delighted to participate in the Technology Day awards function 2004 organized by Ministry of Science and Technology. My greetings to all the award winners, organizers, members of the Technology Development Board of Department of Science and Technology, distinguished guests and other teams.

During my periodical address over AIR, on Technology Day - 11 May 2004, I narrated the milestones and the progress India has achieved technologically in the year 2003-2004. It may be relevant to you. We had received hundreds of inputs from our technological community across the nation in various disciplines. For brevity, I had discussed nine technological events, which had the potential to penetrate into our economy and assist the transformation of our society. They were: Seed Cotton Productivity; Electricity Generation from Municipal Waste; A Brand in Automobile Technology; Fast Breeder Reactor; Birth of an Indian Cryogenic Engine; Light Combat Aircraft (LCA) - TEJAS crossing the Sonic Barrier; Mapping the Neighbourhood by the Children; Synergy Mission for Environmental Upgradation and Digital Library in every Panchayat. You may get the details from my website www.presidentofindia.nic.in.

Today I would like to focus on the technological challenges which will enable faster transformation of India into a developed nation. What should be our essential need? How to channellize our energies? How to make use of our core competence, the human resource and physical resource to the national advantage?

The national developmental challenges are many involving integrated action namely: agriculture and food processing, education and health care, information and communication technology,

infrastructure and self-reliance in critical technologies. As technologists, you can contribute in many areas like education, health care, disaster prevention and mitigation, e-governance, urban planning, rural communication, PURA (Providing Urban Amenities in Rural Areas) and importantly interlinking of rivers. It depends on the integrated application of one technology with other or in combination of multiple technologies such as biotechnology, information technology, space technology, and nano-technology for innovative missions that must address pro-actively acute problems of rapid depletion of conventional energy sources, drinking water supplies, and deliver solutions for the man-planet conflict that has led to pollution, climatic change and degradation of ecology and the environment. Hence I am going to discuss with you about the connectivities, which are important in bringing prosperity to rural India, the foundation of our society.

As you are aware, nearly 700 million people of India live in the rural areas in 600,000 villages. Connectivity of village complexes providing economic opportunities to all segments of people is an urgent need to bridge the rural-urban divide, generate employment and enhance rural prosperity.

The integrated methods, which will bring prosperity to rural India are: the physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through internet kiosks; knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes; and economic connectivity through starting of grass-roots level innovation-driven enterprises and self-help groups with the partnership of banks, micro credits for marketing the cost-effective products for improving productivity and mass consumption.

To prevent migration of workforce from rural to urban areas, enriching the rural life and employment generation in rural areas are essential. Teaching entrepreneurship in educational institutions and providing necessary opportunities for sustainable self-employment backed with investment, technology will be an employment generator.

The integrated chain of connectivities (physical, electronic, knowledge resulting into economic) in a time bound manner along with venture capital funding will generate economic development with large scale employment potential leading to rural prosperity. I would like to discuss two examples - tele-education and seawater desalination, where technology infusion is needed.

When we provide electronic connectivity to the rural areas with the broadband, satellite and wireless connectivities for last mile access, it paves the way for knowledge enablement to the rural people via tele-education. Through this, we can take the knowledge to their doorsteps with the latest innovations, digital library, experiences in value-addition, state-of-the-art practices, system oriented approach, entrepreneurial management skills, technical skills, business knowledge with the help of Universities, R&D organizations, industries, management and technical institutions. It also provides a backbone for the schools where adequate number of quality teachers is not available. Tele-education will enable the teachings of the good teacher available to the remote corners of the nation in a two-way tele-education mode. A good teacher from remote rural area also can teach seamlessly from the remote location to the other parts of the country. The present systems available do not provide these facilities in full and are expensive. The infusion of technology is needed to make these systems affordable for every one of our panchayat and our villages, so that the knowledge can reach the common man in all the corners of the nation. We are advancing in this direction. I would like to give my recent personal experiences. Rashtrapati Bhavan was connected to Carnegie Mellon University, Pittsburgh, USA through Internet and voice over IP (Internet Protocol) in a low bandwidth configuration. I had an interactive conference with the scientists of CMU on “Digital library for every panchayat in India”. Also, during this week, I interacted with the scientists from NASA and India attending the Indo-US space congress, at Bangalore from Rashtrapati Bhavan using VSAT. Both these technologies—the satellite based and Internet based, are complementary to each other and are needed for tele-education. Satellite communication provides one to many connections with easy scalability to even a billion people. The Internet-based technology is a connectionless

network and because of its use of IP, it is amenable even for communicating with small form factor mobile devices. These are good for one to a few interactive interactions. When we talk about remote education, we need to have a combination of intense interaction between the students and the teachers but when it comes to delivery of lectures, technologies for communication of one to many should be made cost-effective and affordable. We should also create quality content so that our entire education can be remotely accessible and can work seamlessly with our collegiate and school education. These systems with certain additional medical instrumentation should provide tele-medicine and even health awareness facility also. Tele-medicine connects urban hospitals, district hospitals to the Primary Health Centres in the rural areas.

Globally, there are a few solutions to solve water shortage. I would like to give certain suggestions; definitely it may be of interest to you. The first solution is by redistribution of water. India has already started this by widespread promotion of rain water harvesting in both rural and urban areas, but it has to be done in a mission mode as a few states are already doing. In addition we need to put a stop to large-scale wastage of water and promote water recycling on compulsory basis in urban and rural areas. It is essential to note that we get monsoon rain only for three months in most of the places, whereas the consumption is for all 365 days using the ground water. The other major programme, which is under the consideration of the Government, is the linking of rivers, which also needs multiple technological inputs.

Fortunately, we have a resource of 91% of water in the form of oceans and seas. Therefore, the second solution would be to create new perennial sources of fresh water by seawater desalination. There are many desalination plants already established all over the world. Every year in our country, the drought or flood conditions are experienced damaging the habitat and certain human loss. We resort to partial solutions with large amount of expenditure. Presently in India there is certain water management for irrigation purposes useful for food production. The demand for food may get doubled in two decades. Therefore the planning of water through desalination process and interlinking of rivers has to be planned together in the development

of additional water resources for irrigation and potable water for drinking.

India attaches importance to technological solutions for various desalination processes. Fortunately Department of Atomic Energy, DRDO, CSIR, IIT Madras and academic institutions are working in different processes for desalination, whereas we should recognize that there are already operational plants elsewhere in the world. Nuclear Desalination Demonstration Project (NDDP) at Kalpakkam has demonstrated the safe and economic production of good quality water by desalination of seawater comprising of 4500 cubic metre per day by Multi Stage Flash (MSF) and 1800 cubic metre per day by Reverse Osmosis (RO) plant. The plants can be scaled up many times. The design of the hybrid MSF-RO plant to be set up at an existing nuclear power station is another solution. The MSF plant based on long tube design requires lesser energy. The effect on performance of MSF plant due to higher seawater intake temperature is marginal. The preheat RO system part of the hybrid plant uses reject cooling seawater from MSF plant. This allows lower pressure operation, resulting in energy saving. The two qualities of water produced are usable for the power station as well as for drinking purposes with appropriate blending. The post treatment is also simplified due to blending of the products from MSF and RO plants. Another approach is the use of dual-purpose plants, where the desalination plant is connected to an electricity plant, utilizing the waste heat from the electricity plants run by nuclear energy. I understand, under favourable conditions, dual-purpose plants decrease the cost of desalinated water below those of conventional desalination methods, primarily through energy conservation.

Last year, I visited the Umm Al Nar desalination plant in Abu Dhabi, which produces nearly 500 million litres of fresh water per day using the MSF (Multi Stage Flash) process. This one plant has totally transformed the ecology of the desert, and is an example of how large scale water supplies may be obtained from the oceans. In this process the seawater has to be flashed into steam by heat addition at low pressure. When the steam is condensed to produce fresh water, part of the energy is used to run steam turbines to produce electricity to feed back to the grid.

But for India we need new processes and new solutions like use of reverse osmosis using solar energy and MSF using nuclear energy. It is also essential to set up the desalination plants next to the nuclear power stations to reuse the waste energy effectively. The technologists and industrialists who have assembled here should come out with unique technological solution to produce water for drinking and irrigation through seawater desalination process in a cost effective manner.

Now I would like to discuss how innovation could be nurtured through the infusion of technology and the need for instituting of a special award by Technology Development Board.

In the Ministry of Science and Technology there are two major schemes, which I am personally aware of. Technology Development Board, which leads to commercialization of technologies, developed by lab/industry, and also we are witnessing today, technology awards are given to recognize the excellence. The same Ministry has another important scheme through National Innovation Foundation tasked with the mission of bringing out and growing national grass roots technological innovations and traditional knowledge. They give awards to a few grass roots innovations, which are selected from thousands of proposals. Some of the innovations for which awards have been given in the past years are: Low cost hand pump, Coconut harvester, Portable power generating device, Convertible three wheel tractor, Self propelled weeder etc. But very rarely, these innovations are converted into a commercial proposition having a societal impact. The Technology Development Board may consider introducing from the year 2005, at least two awards exclusively for shaping the innovation into a globally competitive commercial application through technological value addition with appropriate funding mechanism. This may need nurturing of two thousand innovations to select two. Now I would like to discuss with you the law of development, which brings out the need for competitiveness in our products.

How to become competitive? I was studying the development patterns and the dynamics of connectivity between nations, especially in trade and business. As you all know, the world has a few developed countries and many developing countries. What is the dynamics between them and what connects them? Developed country has to market its

products in a competitive way to different countries to remain as developed country. The developing country to get transformed into developed country too has to market its products in other countries in a competitive way. Competitiveness has three dimensions: quality of the product, cost effectiveness and supply on time. Indeed this dynamics of competitiveness in marketing of products by developing and developed countries determines the law of development. We have to see our integrated missions for national development with competitiveness index in mind.

I have worked in many technological areas and management groups, and based on certain experiences, I have evolved a definition for technology:

- Technology as integration of multiple proven scientific results and put to use for national development and thereby prosperity.
- Technology can also be defined as maturity of scientific discovery to result in multiple applications.

Of course there is a time difference between innovation and commercialization. In electronics and communication systems it takes less than five years for invention to become an application/product and about ten years for material and manufacturing fields.

- Technology is a non-linear tool that can effect the most fundamental changes in the ground rules of economic competitiveness.
- Science is linked to technology through applications.
- Technology is linked to economy and environment through manufacture.
- Economy and environment link technology to society.

The integrated relationship of science, technology, and environment, manufacturing and marketing has tremendous impact on the society. I congratulate all the awardees and greet the organizers from DST.

Wish you success in your mission of promoting technology for societal change.

Wockhardt in the Field of Biotechnology

I AM DELIGHTED to participate in the inauguration of Wockhardt Biotech Park. My greetings to the organizers, pharmaceutical technologists, chemists, doctors, academicians, other participants and distinguished guests. Recombinant biotechnology is indeed a very important route in realizing the bio-pharmaceuticals. I am happy to know Wockhardt has specialized in this area through research and also has developed and produced many drugs of importance.

The three products: Biovac-B, Wepox and Wosulin produced and marketed by Wockhardt are indeed competitive in the pharma market. I am sure that Wockhardt will keep pace with biotechnology research and also participate in the convergence of biotechnology, information technology and nanotechnologies.

Now we have seen the biotechnology wave following the IT wave that we have experienced earlier. Realizing the importance of this, many institutions in India have built biotechnology parks. We are also seeing a large number of start-up companies — much the same way as we had seen during the IT revolution. In a decade from now, the biotechnology would form a very significant part of our economy—both domestic and export economy. We have already started seeing the convergence of biotechnology and nanotechnology as well as biotechnology and information technology.

Now we believe nanotechnology is the new technology that is knocking at our doors. It has wider applications compared to information technology. It will be the central focus for many technologies to converge and open a large number of applications. Further, this technology will have a large domestic market potential leading to a robust economy. Nano-biomedical sensors will play a major role in glucose detection

and endoscopic implants. Drug delivery system will revolutionize the health care to a large extent.

Recently I met Prof. Vijay K Varadan of Pennsylvania State University, US. He shared his experience on the possible line of treatment for Parkinson's disease and Epilepsy. The primary symptoms in Parkinson's disease as you all are aware are tremor or trembling in hands, arms, legs, jaw, and face, rigidity or stiffness of the limbs, slowness of movement and impaired balance. Prof. Varadan has devised a wireless system for monitoring and control of Parkinson's disease. The system consists of an implantable DNA insert in the head region for generating a pulse to the nerve system; controlled either by a modified pacemaker or smart hat. Passive polymer-based gyro sensor is implanted in the tremor location, the sensor gets the power from the Pacemaker and the Pacemaker then reads the tremor motion. The Pacemaker then generates the pulse in the implanted device in the head to control the tremor. This appears to be a promising line of treatment for such diseases. Prof. Varadan also has reported that a few patients affected by Parkinson's disease had a full recovery. This is the promising area of research in which many of our Indian pharmaceutical companies can concentrate.

In India many R&D organizations and pharma industries discover the molecules, and most of the pharmaceutical molecules are sold to multinationals abroad. The benefit of value addition goes to the foreign companies. The pharmaceutical business in the WTO environment will have to be competitive. Competitiveness springs from technological strength. The research and drug design, development and acceptance for introduction are indeed a big mission. Particularly pharmaceutical manufacturers need to prepare themselves for the challenges—design to drug development, production and marketing. I am happy to see, similar work is being done in this biotechnology park.

We are now fast moving into the world of Intellectual Property Rights and Patents under the new international regimes which are unfolding before us. To make sure that we do not lose out to any of the IPR issues, it will be necessary to properly document all our research work and to put in our claims for patents whenever we feel it worthwhile

to do so. Wockhardt scientists in collaboration with NIPER, certain CSIR Labs and other institutions should become the repository of IPR-related activities not only to ensure that we protect our Intellectual Property of the modern times, but also to ensure that our repository of traditional medicinal knowledge is properly documented and can be put to strategic use to prevent IPR piracy.

Indian pharmaceutical industry is worth \$ US 4 billion retail sales in domestic market, in addition to US \$ 2.6 billion in exports. Export growth is due to export of new molecules (generic), especially to regulated markets. Through molecule exports we are only helping the developed countries for value addition. As reported in SCRIP WORLD PHARMACEUTICAL NEWS UK, India ranks 4th in the world accounting for 8% of world's drug production by volume and 1.5% by value. It ranks 17th in terms of export value of bulk actives and dosage forms. Indian exports are sent to more than 200 countries around the globe including highly regulated markets of US, Europe, Japan and Australia. The larger pharma units number around 200 in addition to 8000 Small and Medium Enterprises (EMEs) during 2003-04, and value of bulk drugs (Rs 70 billion) and dosage forms produced (Rs 275 billion) has grown by 15%.

With the adequate infrastructure and production set-up, the prices of Indian medicines should be competitive in the world market. A number of buyers from developed markets from North America and Europe regularly source APIs (Associated Pharmaceutical Intermediate) and drug intermediates from India. Many Indian companies maintain highest standards in international 'SHE' requirements namely Safety, Health and Environmental Protection in production.

Due to the Government policy initiatives for strengthening research and development in pharma sector by way of fiscal incentives and other steps to strengthen regulatory mechanism, new R&D set-ups with infrastructure are coming up in various regions of the country. Compared to the reported average R&D spending of 2% of turnover in the sector, a few leading Indian pharma companies have increased their R&D spending to over 5% of their turnover, which is a noteworthy achievement. Results of the R&D, manufacturing of drugs with high

quality cost effectiveness and availability world over and higher market penetration should enable India to become the first in production from the present fourth place in the world.

A study by the Confederation of Indian Industry (CII) states that India has an opportunity of launching new drugs developed by the Indian scientists. Such a drug could be developed at a cost of only \$100 million, one tenth the international norm, because of the high intellectual capital of the Indian scientist coupled with low cost of production. Also India's huge population and the prevalence of wide spectrum of disease conditions offers a wide patients resource for clinical trials. The clinical trial cost in India could be as low as \$25 million compared to \$300 to 350 million in the US.

The investigational new drug stage in India is one tenth the level in America. The negative factors are that the Indian companies will have to face growing competitive pressures from the local operation of western multinationals. Some of these companies would develop tactics such as authorized generics to limit the growth potential of Indian companies. There is also a fear of patent challenges. If our industry can cope with these problems I am sure pharma industry can definitely be a great wealth generator for the nation.

Whether India has to eradicate leprosy or TB, to prevent spread of HIV by developing anti HIV vaccine, or to control cardio vascular diseases by multiple technologies and practices, we in India need something important apart from resources. That is creative leadership in all fields, particularly in medical field. Who are the creative leaders? What are the qualities of a creative leader? The creative leadership is exercising the task to change the traditional role from commander to coach, from manager to mentor, from director to delegator and from one who demands respect to one who facilitates self respect. The higher the proportion of creative leaders in the medical field, the higher the potential for successes in diagnosis, treatment and research for discovering new avenues in health care.

I inaugurate the Wockhardt Bio-technology Park and wish all success in your mission of producing and marketing cost-effective quality drugs in the national and international market.

Energy Conservation Solutions to Industry

I AM HAPPY to address the International Conference on Energy Conservation here today. I greet the organizers, energy experts, academicians, industrialists, municipal authorities, building experts, participants and distinguished guests.

When I am in the midst of energy management specialists, I would like to share with you two experiences. The first one is regarding use of solar energy for cost-effective heating at Brahmakumaris Shantivan Complex, Mount Abu and the second one is related to use of Nanotechnology for producing energy-efficient and cost-effective LEDs (Light Emitting Diodes).

Solar cooking is one of the important applications in the field of renewable energy. During the last 20 years many designs and concepts have been developed and tested in the field of family cooking in the form of box type solar cookers. Now new technology has come to complement the box cookers. With this new technology it is possible to cook for a larger number of persons using solar energy within a short span of time. Prajapita Brahmakumaris Iswariya Vishwa Vidyalaya has become one of the institutions, who have manufactured in their own workshop at their premises and installed a large solar steam cooking system at their headquarters Shantivan Complex, Abu Road, Rajasthan. The system is designed for cooking 2000 meals twice daily based on the certain technological collaboration. Typical power generated is one mega watt hour per day. I am citing this example to suggest to you the necessity for making such systems in all our big apartments, hotels and industrial complexes, which can substantially reduce the energy, cost and also minimize the pollution created by using other forms of energy sources.

Dr. R.N. Bhargava, a Nanotechnologist from USA came and met me at the Rashtrapati Bhavan. He demonstrated to me a very optimal and efficient lighting system based on Nano crystals. The recent advances in semiconductor-based lighting chips—Light Emitting Diodes (LED) can provide six hours of reliable light to every home or shop in a village at virtually no recurring energy cost and minimum installation cost. These LEDs require a tiny fraction of energy used for other forms of lighting. LED-based lighting can be easily provided with solar panels or foot pedal generators. For nearly 40 years LEDs were weak color light sources (Green, Amber and Red) used mostly as indicators and numeric light. LED technology in recent years has improved dramatically. Today LEDs, using 10 watt of power could produce light equivalent to a sixty-watt filament lamp. Filament lamps are highly inefficient since 90% of the energy is dissipated as heat. Fluorescent lamps are more efficient but still waste energy by heating gases, whereas LEDs convert energy to light very efficiently. Typical LED lamps burn over 10 years or longer, they withstand much greater temperature changes, mechanical vibrations and shock. They are reliable and fade away slowly and there is no sudden stoppage of light. New discoveries in nanotechnology make LEDs much brighter and make the products less expensive, which can revolutionize rural electrification for lighting. The field is fertile for research and development of high efficient and low cost LEDs, using Nano-Crystal.

Let us now address energy conservation issues pertaining to buildings and related services. Energy is required while constructing the buildings and subsequently for their maintenance in the form of providing lighting, maintaining a desired particular temperature, provision of essential services such as water, drainage system, heating, cooking etc. The building design has to take into account both these aspects so that construction cost of the building can be low and also the recurring cost for getting the different services by the occupant is also low.

I was going through the data on transmission and distribution loss taking place in our system. I would like to discuss this issue since loss reduced is equivalent to energy produced.

The major concern is the loss of power in transmission and distribution in our country which ranges from 40 to 50%. That means when we generate 78,000 MW of power, the consumer gets only 47,000 MW of power, whereas in the industrially advanced nations the loss is only 15% (12,000 MW). Hence we could see, comparatively we have an additional loss of 19,000 MW of what we produce. If we have to install capacity for this 19,000 MW we will have to make an investment of over Rs. 76,000 crore at a conservative estimate of Rs. 4 crore per mega watt of power generation. This is the magnitude of the problem we are faced with. We need to take urgent action to remedy the situation and bring down this loss by working on mission mode. In this programme collaboration between energy producers, transmission engineers and R&D specialists is required.

It is reported that the total energy consumption in Indian buildings is as follows: Commercial sector: 21.6 billion kWh (32% for A/C, 60% for lighting, 8% others); Residential sector: 36 billion kwh (35% light, 29 % fan, 7% cooler, 14% Refrigeration, 4% A/C, 11% others).

One of our experts says that for a normally constructed building, the present energy consumption is 300 kwh per sq.m. annually which can be brought down to 140 kwh per sq.m. annually by proper designs/details/philosophy, whereas in Germany with its strict energy codes it is reported that the consumption is only 50 kwh per sq.m. annually. It is all the more important for India to achieve at least a target of 100 kWh per sq.m. annually within the next 5 years. This will need co-ordinated effort between architects, builders and the energy engineers—a newly developed expertise.

The architects and building planners have to play a very important role in the design of the building with these features. The seeds of this perspective have to be sown in the schools of architecture and town planning. Energy conservation should start right from the location of the site, the direction of buildings, windows, doors, glare etc. the aim should be to use maximum advantage of the sun and wind, while minimizing the wasteful heat load from the sun into the buildings and roofs.

The construction sector plays a significant role in economic development of the country. Activities in the construction sector are complex, highly dispersed and resource-demanding. The activities of the sector result in the loss of important natural assets and impose severe stress on the environment. Agricultural land is often lost through urbanization and extraction of raw materials. The consumption of fossil fuels contributes to increased air pollution and emissions of greenhouse gases. Energy is required for manufacturing materials, for transport and for construction of buildings. Apart from this initial energy use, there is also need for energy, for functioning of buildings. In the developed countries there is a growing demand for an environmental impact assessment of all building projects, which includes considerations of embodied energy, i.e. the energy that is consumed in extraction of raw materials and production of finished building materials.

However, construction is crucial to the prosperity and civilization of human beings. People require habitats, schools, work places, markets, places for sports and cultural activities. Our task therefore is to have more and better construction for our billion people, but minimize per capita energy consumption in the whole chain of value addition in construction and maintenance. For example, the comparative embodied energy consumed for different types of buildings is indicated below:

Type of Building	Embodied energy (KWH per sq.m)
1. Residential Buildings	2200
2. Office Buildings	5000
3. Hotels	4000
4. Hospital Buildings	5500

The energy use in the production of building materials accounts for a high proportion of the total embodied energy in buildings, and thus improvement of energy use in production processes is a crucial part of any overall strategy for energy conservation in the built environment.

A good beginning has been made in the energy conservation area due to the enactment of the Energy Conservation Act 2001. Bureau of Energy Efficiency has been formed which has initiated the task of developing Energy Conservation Building Codes.

In addition, peak load sharing techniques would help energy saving. This can be done by working compressors at night and use ice slurry during the daytime. Similarly solar energy peaks can be stored as cooled fluids to reduce air-conditioning loads. Recycling of water for cooling towers will save two critical resources: energy and water.

At this stage I would like to recall my experience during 1983-84, when there was severe shortage of power in Andhra Pradesh. The Defence labs had a peak load constraint of 3 mega watt power, whereas the connected power was over 10 mega watts. This situation led to inefficient working of all the three labs located in the complex. To overcome the situation the three Directors of the laboratories at Hyderabad devised an innovative plan to stagger the working hours in such a way that one set of laboratories used to work for a four day week (from Monday to Thursday) of 10-1/2 hour duration per day. The other set worked on a different four days (Thursday to Sunday) with one common working day available among all labs to facilitate inter laboratory communication. This system ensured conservation of energy and maintained efficiency within the peak load constraint imposed by the state electricity board. This is one way of practical energy conservation.

The energy conservation in the shop floor has to start right from the operator. We have to clearly create awareness and a sense of responsibility among all operators to conserve energy in their own limited area. One method of planned improvement can come by having a constant review of the energy utilization and reasons for variance. The variance analysis will lead to determination of the causes of increase which in turn can be attended to by the maintenance personnel. Also, there is a need to install energy conservation control system which will be initiated whenever the machinery is idle and is not required to be kept on.

In continuous operation chemical plants, switching off and on may lead to inefficient process leading to enhanced energy utilization. Wherever continuous reliable energy is not available it will be economical to use back-up system to ensure process efficiency and prevent infructuous energy expenditure due to unplanned start - stop operation.

India is well poised for the generation of solar energy in view of the continuous availability of sunshine throughout the year. Installation of centralized solar photovoltaic systems, which can be fed to a grid, will be a long-term economically viable solution with added benefits of pollution control. Present solar cells have the efficiency of 13 to 15%. But the research effort shows that, with the advent of CNT/ Polymer Composite Based Photovoltaic Cell, the efficiency of Photovoltaic cell will increase to 50%. This can pave the way for building mini 100 mega watt solar power stations in different regions of the country like Rajasthan, Andhra Pradesh, Gujarat and Tamil Nadu. Industries can plan one or two megawatt captive power plants based on either solar energy or biomass plants using solid waste.

Energy is a vital input for industry. Enterprise-wise energy conservation is an important wealth generator for every industry. For ensuring competitiveness per capita energy utilization is an important index. Keeping this in mind, I would request the Conference to address the following issues relating to practical energy conservation implementation strategies:

- (a) Evolve energy utilization norms for different industry such as cement, aluminum, steel, urea, textile etc. on per capita basis and provide a challenge to designers to work towards the target.
- (b) Create an enterprise-wise review mechanism to reveal the variance from planned utilization to the actual. As far as possible try to allocate the responsibility for this variance and take immediate corrective action.
- (c) Create an idea bank in which employees can provide innovative solutions for energy efficient operations.

There must be a system of analysis of ideas for implementing practical ideas on the shop floor.

- (d) Progressively install energy efficient lamps, energy efficient heating and AC system in the enterprise.
- (e) Energy conservation award through a structured competition can be introduced among the various divisions in the enterprise.
- (f) In house R&D establishment should constantly work towards energy efficient processes for adoption.

My best wishes to all the participants of this Conference for a fruitful deliberation and providing energy conservation solutions to the industry.

International Partnership in Lunar Missions

I AM DELIGHTED to participate in the 6th International Conference on Exploration and Utilization of the Moon organized by the Physical Research laboratory, Ahmedabad. I greet the organizers, eminent planetary exploration and space scientists from India and abroad, academicians, industrialists, engineers, entrepreneurs and distinguished guests. I understand that the International Lunar Conference is a forum to discuss scientific results of the ongoing and future space missions related to lunar exploration. This Conference is also utilized to develop understanding on various strategies, initiatives and missions leading to a permanent human presence on our Moon as the future objective.

I am happy to note that the interactions that took place in the earlier Conferences have been beneficial to participating countries through the intense sharing of scientific knowledge, data and hands-on mission experiences of various space agencies pursuing lunar exploration programmes.

I find that nearly 100 scientific papers are being presented in this Conference and that the moon missions being planned and conducted by all the space faring nations of the world are being presented, reviewed and discussed. I note with excitement that many key issues related to space science and moon missions are being addressed in this Conference. These deliberations are important for the world space science community. This will enable you to obtain a comprehensive picture of the goals and policies of all nations striving towards a common vision of space research being made available for the benefit of all mankind. Indeed this augurs well for progress towards universal peace and harmony that is a cherished goal of the people of the world as a whole.

During the 20th century, discoveries of significance were rarely motivated by political needs except during the World War and cold war periods. Whereas in the 21st century, challenges are put on science, particularly the space sciences, due to the six billion growing population of the planet, whose needs are continuously increasing and the resources are continuously diminishing in the areas of energy, water and minerals.

Hence space scientists have to work for building satellites with high performance sensors and developing cost-effective launch systems for meeting the growing demand for such launches. The International Conference may discuss not only the scientific research needed for planetary exploration, but also should address the problem of bringing down the launch cost through the application of advances in space science and technology.

Between the Moon and earth there are five Libration Point regions called L1, L2, L3, L4, and L5. In these regions the gravitational force is minimum and tends to zero. L2 is the preferred Lunar Material Transfer Station. L4 and L5 are the preferred locations for the Space Colony, which is progressing to become a reality in the next two decades time. It is essential to characterize L2, L4, and L5 points and also configure the Lunar material Transfer Stations and Space Colony Habitat.

Space science has had a phenomenal growth due to the availability of rockets and spacecraft that can carry hundreds of kilograms of apparatus into interplanetary space, and thus obtain data, which we could otherwise never get from the ground.

The Western nations and Russia made available such rockets and spacecraft for scientific work from early 1950's. The Eastern nations Japan, China and now India started a few decades later. Obtaining such scientific data opens new avenues of attack on some of the most important problems in science. These problems are related to the manner in which the sun controls the atmosphere of the earth, the moon, and other bodies in the solar system; to the origin and history of the solar system; and to the structure and evolution of the stars and galaxies.

The moon has retained a record of its geological history that

probably extends back through many billions of years to the infancy of the solar system.

For an understanding of the early history of the solar system the Moon is even more important scientifically than Mars and Venus which like planet Earth have atmospheres and geological activity which change the face of the planets with passage of geological time. The moon thus plays a special role in the investigation of the solar system and its exploration and utilization.

The area of the moon is one-sixteenth that of our planet, more than that of Africa. Such a territory will take many years (and perhaps many lives) to explore in detail. Its mass is billions of times more than all the coal, iron, minerals and ores that man has shifted in the whole of history. But the moon does not have enough mass to give it a gravitational pull and hence the moon has just one-sixth of earth's gravitational pull.

This low gravity has several consequences, almost all of them beneficial for mankind's utilization of the moon. The most important is that this low gravity has made the moon unable to retain an atmosphere if it ever had one. Hence for all practical purposes, the lunar surface is a perfect vacuum. With no atmosphere to retain the sun's heat, the moon is a world with very great temperature extremes. No air means no weather, and the only change is the unvarying cycle of day and night.

Turning slowly on its axis, the lunar day and night are almost thirty times that of planet earth. Since this is about the same time the moon takes to revolve around the earth, it always keeps the same hemisphere turned towards the earth. Until Russian scientists, in October 1959, with their Lunik III moon probe took pictures of the reverse side of the moon, mankind had never till then known about the dark face of the moon!

These lunar characteristics have a vital implication for space science. As civilization spreads throughout the solar system, the moon will provide the main link between earth and her scattered children. The earth's ionosphere reflects all but the shortest radio waves back to earth. Its erratic atmosphere prevents the use of lasers for

communication into space. On the airless moon this would not be a problem, for the moon's sky is perennially clear to waves of all frequencies.

Thus the moon will soon become a "Telecommunications Hub" for interplanetary communications, aiming its tightly focused laser beams to other planets and ships in space. With interplanetary communication systems located on the far side, the moon would also shield these communication stations from the continuous radio emissions from the earth. The far side of the moon would be the quietest place within millions of kilometres from the earth, in the sense of radio silence.

Earth-based plans for space travel requires gigantic boosters with tiny payloads. The payload fraction of rocket launchers does not exceed more than 1 or 2% of the launch weight. Thus to put one or two tonnes in space requires more than one hundred tonnes of launch mass most of which—nearly 70%—is oxygen. Even the Space Shuttle that has had two tragic failures carries just 30 tonnes and its launch weight is over 2000 tonnes.

Such gigantic rocket-based space transportation systems, with marginal payload fractions, are wholly uneconomical for carrying freight and men to the moon. It can be compared to a transcontinental aircraft carrying just one or two passengers and being discarded after the onward trip.

Studies in India have shown that the greatest economy through the highest payload fractions is obtained when fully reusable space transportation systems are designed which carry no oxidizer at launch, but gather liquid oxygen while the spacecraft ascends directly from earth to orbit in a single stage.

Using the earth's atmosphere synergistically for space transportation is thus one of the most effective means for low cost access to low earth parking orbit in outer space. In fact, as far back as 1964 studies in the US have reported that a payload fraction as high as 30% is obtainable with in-flight collection of liquid oxygen for space flight.

The studies in India suggest that an “aerobic” space transportation vehicle can indeed have a 30% payload fraction provided its launch weight is about 1000 tonnes, or about half the weight of the space shuttle. With 20 times the payload fraction and 100 times reuse, the cost of payload in orbit can be reduced dramatically by 20×100 or nearly 2000 times lower than current shuttle costs of access to space.

Thus, scientific exploration of the moon and the solar system will go on using the rocket launchers of the later part of the 20th century. However, the real economic value of moon exploration and utilization will occur only when mankind builds fully reusable space transportation systems with very high payload efficiencies. This will become available when the technology of oxygen liquefaction in high-speed flight in earth’s atmosphere is mastered. This technology will also come in useful for mass collection from the atmosphere of other planets at a later stage in space exploration.

So we have to get into space from earth at very, very low cost first before freight and manned missions to the Moon and Mars missions become feasible. I note that among the papers being presented in this Conference is one on International Collaboration on Space Transportation Systems to the Moon and Mars, and hope these studies consider, with India, new types of “aerobic” space transportation for low cost access to space.

The low gravity and hard vacuum on the Moon’s surface is, however, a very great advantage from space transportation considerations for the return flight to earth. Space vehicles could leave the moon without burning any fuel at all. A horizontal launching track like those used on aircraft carriers could accelerate the vehicle electrically because there is no air resistance on the moon’s surface, and lunar escape velocity of 2.3 kms per second compared to the 11.2 kms/sec for escape from earth’s gravity. Thus the only fuel a vehicle would carry while returning to earth from the moon would be a small amount for re-entry manoeuvres and landing.

Thus, two systems and related technologies would result in spectacular improvements on the current state-of-the-art expendable rocket launchers for routine, economical moon missions. These are

firstly, reliable, high payload-fraction, aerobic reusable space transportation systems to place smaller moon-mission vehicles in parking orbit, and secondly, electrically operated catapult-launchers on the moon's surface to enable these small vehicles to return to earth.

It is certain that civilization on earth will run out of fossil fuels in this century. Oil reserves are on the verge of depletion, followed by gas and finally coal. However, solar energy is clean and inexhaustible. Even if 1 % of India's land area were harvested of solar energy, the yield would be nearly 1000 gigawatts, or 10 times more than the current consumption. However solar flux on earth is available for just 6-8 hours every day.

Space solar power stations have been studied extensively in the past 30 to 40 years. However, non-availability of low cost, fully reusable space transportation has denied mankind the benefit of space solar power stations in geo-stationary orbit. These orbits are almost full now and an option is to set up space solar power constellations in low earth equatorial orbits especially for developing countries.

Unlike Earth, the Moon is the ideal environment for large-area solar converters. The solar flux to the lunar surface is predicable and dependable. There is no air or water to degrade large-area thin film devices. The Moon is extremely quiet mechanically. It is devoid of weather, significant seismic activity, and biological processes that degrade terrestrial equipment. Solar collectors can be made that are unaffected by decades of exposure to solar cosmic rays and the solar wind. Sensitive circuitry and wiring can be buried under a few to tens of centimetres of lunar soil and completely protected against solar radiation, temperature extremes, and micrometeorites.

Studies have also shown that it is technically and economically feasible to provide at least 100,000 GWe of solar electric energy from facilities on the Moon. The Lunar Solar Power (LSP) System can supply to Earth electric power that is independent of the biosphere and does not introduce CO₂, ash, or other material wastes into the biosphere.

Inexhaustible new net electrical energy provided by the LSP System enables the creation of new net material wealth on Earth that is decoupled

from the biosphere. Given adequate clean electric power, humanity's material needs can be acquired from common resources and recycled without the use of fossil fuels. LSP power increases the ability of tomorrow's generations to meet tomorrow's needs, and enables humanity to move beyond simply attempting to sustain itself within the biosphere to nurturing the biosphere.

In the last century, man has consumed more of the earth's mineral resources than since the emergence of human beings on earth millions of years ago. A time will soon arise when earth is fully depleted of its mineral wealth and need would arise for mining in space. NASA-Apollo missions found that lunar surface soils are comprised of about 20 per cent metals (suitable for space construction) and 20 per cent silicon (which is needed for making solar power cells). Much of the rest of lunar soil is composed of oxygen.

The Moon also has other advantages as a source of construction materials for near Earth orbit. Its weak surface gravity is only one-sixth as strong as Earth's. As a result, in combination with its small diameter, it takes less than five per cent as much energy to boost materials from the lunar surface into orbit compared with the launch energy needed from Earth's surface into orbit. Electromagnetic mass drivers powered by solar energy could provide low-cost transportation of lunar materials to space construction sites.

Low gravity manufacturing holds tremendous promise for mankind in new materials and medicines. The US is reported to be keen on setting up a manned base on the moon soon. Studies also have shown that the needs of 12 workers could be met by a 16-metre diameter inflatable habitat. This would contain facilities for exercise, operations control, clean up, lab work, hydroponics gardening, a wardroom, private crew quarters, dust-removing devices for lunar surface work, an airlock, and lunar rover and lander vehicles. The lunar mining base could also enable man to bring back to earth shipments of Helium 3, which is reported to be abundant on the moon, as a valuable fuel for thermonuclear reactors.

I would suggest to the Conference to undertake the following areas for discussion:

1. Creation of a data bank of all the scientific experiments relevant to lunar exploration carried out in the past and planned in the future.
2. Based on the analysis of the space scientific experiments done so far associated with lunar missions, new experiments can be designed for meeting the geological need, moon mapping, resource locations, and identification of possible sites for locating industrial units including drug development.
3. Planning for future lunar experiments with international co-operation, for cost-effective missions.
4. Evolving the standards for payloads and piggy pack payloads which will go into exclusive scientific spacecrafts for lunar missions. Also standards may be generated for small and medium payloads that can be integrated as piggy pack payload in the Polar, Geo-synchronous launch vehicles. This action will result in a number of payloads in orbit through the participation of a number of countries.
5. Working out a strategy and a standing mechanism for getting the support of deep space network stations during the operation of lunar missions of different countries.
6. Creating a mechanism of exchange programme for the young space scientists to work in different laboratories pursuing planetary exploration programmes.
7. Nominating a team of experts among the conference participants to create a data base and information system of all the exploratory work executed so far on lunar missions by different countries which can be subsequently made available for participants through the website of this conference.

Our Moon is one of the 70 Moons in the solar system. Galileo was the very first person to see the mountains of the Moon, Jupiter's moons and the Pliades star clusters through a telescope. Even after

400 years, the excitement of discovery still has not subsided and every astronomer and the budding students of astronomy have been able to explore the moon with binoculars and telescopes and share their excitement with birds of the same feather.

Many centuries ago, an Indian sage, Maharishi Patanjali said that before man attempts to conquer outer space he needs to understand fully his inner space. This call for vision with caution is as true now as it was in the past, probably more so. The Universe has evoked either one of two responses in human beings. Fear of the unknown or a determination to find out more about the universe and how it works.

From the first was born a belief in God, which ultimately took the form of the great religions of the world. From the second rose a long tradition of scientific inquiry. However, science and spirituality are not mutually exclusive at the deeper levels. There is an interesting anecdote about Isaac Newton. He had invited a scientist friend of his, a professed atheist, to dinner. Newton had a model of the solar system on a table. The friend was enchanted with the model and exclaimed “What a beautiful and exquisite model, who made it?” To this Newton replied: “How can you suggest that this model has a maker when you say that the universe itself has no Divine Creator?”

One can therefore conclude that science, especially space science exploring and utilizing the universe as a whole, can actually strengthen and even reinforce rather than weaken our faith in a Supreme Being. While a truly pious person loves God with his heart, a truly dedicated scientist loves God with his mind.

Man’s quest to understand this closest neighbour of ours and our only natural satellite is a parallel to his efforts to understand universal nature as a whole. Many generations would continue to work together for exploring and utilizing lunar resources. The Moon will be a continuous source of exciting new research, surprises and above all a vehicle for making science what it should be – a tool to understand nature and apply for societal upliftment.

Nanotechnology to Make India a Tech-Savvy Nation

SINCE THIS SCIENCE CONGRESS focuses on health technology as fulcrum of development, I am starting with thoughts on pharma and health care.

In the year 2004, I have visited five R&D laboratories of pharma industries and three health centres and also I have addressed seven medical conferences on Ophthalmology, Cardiology, Liver diseases, allergic diseases, Vascular surgery, general surgery, atherosclerosis and thrombosis and Pharma Vision 2020. I was very happy to see the economic strength of the pharma industry resulting from the technological innovation of their R&D laboratories. In the year 2000 there was a fear among the members of the health sector and scientists that they would not be able to compete in the international market due to WTO environment. When I now visited these pharma units, I find the situation is totally changed. The confidence of the pharma community is coming in a big way due to the establishment of state-of-the-art R&D labs. During my visit I discussed with the scientists and technologists and I am completely convinced that Indian pharma sector is becoming very robust with a sound research and development base. Even though they have developed hundreds of molecules, the way the scientific and laboratory experiments are progressing, I am convinced that at least three major molecules will transform into drugs very soon.

Now I would like to give my visualization of developed India in 2020 and the mission of scientific community.

1. A Nation where the rural and urban divide is reduced to a thin line.

2. A Nation where there is an equitable distribution of energy, quality water and access to quality electric power.
3. A Nation where agriculture, industry and service sector work together in symphony, absorbing technology thereby resulting in sustained wealth generation leading to higher employment potential.
4. A Nation where education is not denied to any meritorious candidates because of societal or economic discrimination.
5. A Nation which is the best destination for the most talented scholars and scientists from all over the world.
6. A Nation where the best of health care is available to all the billion population and the communicable diseases like AIDS/TB, water and vector borne diseases, Cardiac diseases and Cancer are extinct.
7. A Nation where the governance uses the best of the technologies to be responsive, transparent, easily accessible and simple in rules, thereby corruption-free.
8. A Nation where poverty has been totally eliminated, illiteracy and crime against women are eradicated and the society is unalienated.
9. A Nation that is prosperous, healthy, secure, peaceful and happy.
10. A Nation that is one of the best places to live in on the earth and brings smiles on a billion plus faces.

These are the ten dimensional transformations needed for competitive India and we have to work for it. Towards this end I would like to share thoughts on expected important achievements in Science and Technology in 2005.

I have visited a number of science and technology laboratories and also had the opportunity to interact with the scientists and technicians. My assessment is: five important S&T areas will influence Indian society in health care, education, employment generation and defence during 2005.

Many Indian laboratories and hospitals are working in Research and Development of Stem Cell growth. Advancement in stem cell research in the country has brought confidence among expert doctors to take up its clinical application in heart, eye, pancreas, liver, neural, kidney diseases and spinal injury. Drawing of tens of thousands of stem cells, which are capable of transforming themselves into almost any kind of tissues from the suffering patients and injecting them into the heart to stimulate heart restoration has already been practised. This increases the pumping efficiency from 25% to 40% over a period of four months. The recent identification and characterization of progenitors with stem cell properties has opened new avenues that will be useful for treating functional impairments caused by the death of specific cell population in the eye region. The stem cells also help restoration of vision in patients who have these diseases, by repopulating the damaged ocular surface cells or retinal cells from further degeneration. Many health care institutions in India are working in stem cell area and have successfully treated heart patients and eye patients. Recently a patient with spinal cord injuries has been successfully treated with stem cells from umbilical cord blood in South Korea and it could signal a leap forward in the treatment of spinal cord injuries. Definitely we will see widespread stem cell research and its application to treatment of many diseases in a cost-effective way.

Availability of quality education for remote areas requires tele-education as a vital tool. ISRO's EDUSAT (Educational Satellite) programme is designed to provide support to education through low-cost ground segments and to reach the un-reached people of India. The satellite is specially configured to have multiple beams covering different regions of India, through five regional beams and a national beam.

This system will be useful for school, college, higher level of education; and non-formal education. The EDUSAT, when fully operational will have a capacity of 30 uplinks and about 5000 remote terminals per uplink. EDUSAT is expected to provide one-lakh fifty thousand ground terminals in its full capacity. EDUSAT is not only a Receive Only Terminal system; it works on an IP protocol and brings

both way interactivity and collaboration. EDUSAT coupled with the broadband through fibre, land wireless broadband will form a heterogeneous network in taking the quality education to all parts of the country. For example, a mathematics teacher takes a class at Bhimavaram, Andhra Pradesh; it is beamed to EDUSAT satellite in real time and the students in the class rooms at Samastipur in Bihar will see the teacher and hear the lessons. Hence a good teacher teaching anywhere in the country in any language can be heard, seen and interacted with through the implementation of interactive tele-education delivery system over the EDUSAT, broadband and wireless communication channels.

Use of bio-fuel will increase manyfold. Bio-fuel plant farming, harvesting, extraction and esterification process will provide large employment opportunities apart from bringing down the import of crude oil. *Jatropha curcas* is one of the bio-fuel plants and it can grow well in dryland with very little water input. Once grown the crop has fifty years of life. Fruiting can take place in this plant from six months to three years. It yields up to five tonnes per hectare of oil seeds which can produce two tonnes of bio-diesel. Bio-diesel plants grown in eleven million hectares of land can yield a revenue of approximately Rs.20,000 crore a year and provide employment to over eleven million people both for plantation, running of the extraction plants and transesterification. Use of bio-diesel is carbon monoxide emission free. This oil can also be used for soap and candle industries. It gives the by-product called glycerin, which is used in pharma industry. De-oiled cake is a raw material for composting and plantation is good for honey production. *Jatropha* saplings can be multiplied through tissue culture and further research is required on hybrid varieties for increasing the oil content of seeds and drought resistant characteristics of the plant. Presently, the indigenously designed bio-fuel plant for 250 ltr/day is in operation. We have to design and develop bio-fuel plants of 3 to 10 tonnes per day capacity for installation in different parts of the country. Effective marketing chain need to be planned for enabling farmers to reap the benefits directly. Bio-fuel mission will provide technological and employment generation focuses for the rural sector. Use of eleven million hectares of waste land for *Jatropha* cultivation can lead to generation of minimum twelve million jobs.

The Indo-Russian joint venture has developed the supersonic cruise missile, the first of its kind in the world scene. It is a remarkable achievement for both countries. It is a force multiplier for defence forces. It is a universal missile flying at the speed of Mach 3 for multiplatform configuration by a variety of trajectories against multiple targets. It is an opportunity for India and Russia to go in a big way to produce competitively and market the Brahmos to suitable countries.

This year I have visited a number of pharma R&D centres. There is a great movement in transforming molecules to drugs. I feel in 2005, at least three drugs will materialize leading to the treatment of a certain type of cancer and the other for diabetes and inflammatory diseases. In addition to the above scientists have to take note of the progress made in nano-science and nanotechnology and participate in research and product development to make India a leading player and become an exporter of nanotechnology products.

Throughout the last 120 centuries, unique cultures have come into existence due to advancement in technology. The first 118 centuries had a dominance of primarily stone, bronze and iron ages. The last two centuries have seen rapid development of chemical age. The advancements made in material science and technology gave the impetus for both nuclear and biological age to flourish. Succession of these technology periods has involved progression from simpler materials to more complex forms of science and engineering. We are today at the convergence of nano, bio and information technologies. This age, I feel, will create historical revolution and we must be at the driver's seat to contribute towards this societal change.

When I think of nano-science and nanotechnology, I am reminded of two personalities. The first person is Richard Feynman, who described the concept of 'building machines' atom by atom in his talk at Caltech titled "There is plenty of room at the bottom". The second person is Eric Drexler, who wrote the book titled "Nano Systems, Molecular machinery, manufacturing and computation".

Since independence, the country had all along been taking recourse to technology for societal changes and economic prosperity. A nation that is alert should be sensitive to the changes that take place to the

technological fabric of the world and prepare itself for the arrival of newer changes in the horizon.

We believe that nanotechnology would give us an opportunity; if we take an appropriate and timely action, we can become one of the important technological nations in the world.

The world market in 2004 is for nano materials, nano tools, nano devices and nano-biotechnology—all put together is over hundred billion dollars. It has been noticed that the fastest growing area among these is nano-biotechnology.

Carbon nano tubes and its composites will give rise to super strong, smart and intelligent structures in the field of material science. Nano-biomedical sensors will play a major role in glucose detection and endoscopic implants. Drug delivery system will revolutionize the health care to a large extent.

Molecular switches and circuits along with nano cell will pave the way for the next generation computers. Ultra dense computer memory coupled with excellent electrical performance will give the society low power, low cost, nano size and yet faster assemblies.

The last four decades have also affected the packaging concept. Electronics packaging of the past has given way to the present Microsystems packaging and the shift in the trend is now towards the futuristic nano packaging.

Recently I met Prof. Vijay K Varadan of Pennsylvania State University, US. He shared his experience on the possible line of treatment for Parkinson's disease and epilepsy. The primary symptoms in Parkinson's disease as you are all aware are tremor or trembling in hands, arms, legs, jaw, and face, rigidity or stiffness of the limbs, slowness of movement and impaired balance. Prof. Varadan has devised a wireless system for monitoring and control of Parkinson's disease. The system consists of an implantable DNA insert in the head region for generating a pulse to the nerve system; controlled either by a modified pacemaker or smart hat. A passive polymer-based gyro sensor is implanted in the tremor location. The sensor gets the power from the

pacemaker and the pacemaker then reads the tremor motion. The pacemaker then generates the pulse in the implanted device in the head to control the tremor. This appears to be a promising line of treatment for such diseases. Prof. Varadan also has reported that the few patients affected by Parkinson's disease had a full recovery.

CNT (Carbon Nano Tubes) based Photo-voltaic Cell: Presently silicon based photo-voltaic cells have only an efficiency of 13 to 15%. This has become a big challenge for converting solar energy into power. Research has shown promise of increasing the efficiency of the photo-voltaic cell to 40 to 50% using CNT. This will enable us to have highly efficient 100 MW solar energy plants in different regions of the country which will have virtually zero recurring cost.

As you are aware, the coastal region of our country faced a severe calamity due to shock embedded tidal wave, which will need an innovative package for reconstruction of homes of the affected population.

The scientists present here, have to ask yourselves, what you can do in such a situation for bringing relief to the people and also what science can do to prevent such devastating occurrences in future. They can definitely contribute in the areas of prediction of earthquake on land and seabed.

The seismologists have put most of their efforts in studying seismic variations and patterns of foreshocks and aftershocks. In certain countries, earthquakes have been successfully predicted using a noticeable increase in background seismic activities. If foreshocks can be recognized early, giving a timely warning can save lives of many people. The stages of a rising seismic activity include building up of elastic strain along a fault, development of cracks, increase in stress, decrease in electrical resistivity etc. This theoretical series of events could eventually lead to a way to predict the occurrence of major earthquakes. The events are still theoretical and need much more data to make them useful enough for practical applications.

Technology is the non-linear tool available to humanity which can effect fundamental changes in the ground rules of economic

competitiveness. Science is linked to technology through applications. Technology is linked to economy and environment through manufacture. Economy and environment linked to technology promotes prosperity to the society.

The scientists and technologists whatever work or mission they do always have to ask the question, will any part of my scientific work have a positive impact on meeting the human needs?

Now I would like to discuss about the challenges that the nation has to overcome and certain missions which are required to be implemented to transform India into a developed nation by the year 2020.

The number of PURA units for the whole country is estimated to be 7000. This envisages integrated connectivities to bring prosperity to rural India. These are - physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through Internet kiosks; and knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes. These three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing of the products.

Each PURA cluster will connect about 20 - 30 villages depending upon the region and population and will cost about Rs.100 crores. This is a viable and sustainable business proposition. After initial short-term employment during construction etc. we have to plan for initiating actions for providing regular employment and self employment opportunities in nationally competitive small enterprises in agro processing, manufacturing and services sectors for about 3000 people. If the industrial/business parks are marketed well, they can generate employment opportunities in support and services sector for about 10,000 people. This will provide sustainable economy for the rural sector. In this national mission, bankers can promote entrepreneurship in the rural areas. This will lead to the removal of urban-rural divide.

A large number of banks have entrepreneurial development programmes. Banks have also been funding small scale industries of different types in various regions. The small scale industrialist is a promising candidate for becoming the chief executive for managing the PURA complexes in an integrated way. PURA enterprises can also undertake management of schools, health care units, vocational training centres, chilling plants, silos and building a market, banking system and the regional business or industrial units. A new mission mode management style has to emerge for PURA enterprises. It should not be looking for protective legislations to support them. Rather they should be efficient to compete with others. This new PURA enterprise needs partnership from the bank, from the Government and also from the private entrepreneurs. Banks can train the entrepreneur for managing the PURA in their training centres and also provide them loans for creating and running PURAs as a business proposition.

I would like to talk to you about the experiences of three of our well known scientists.

Dr D.S. Kothari, a Professor in Delhi University was an outstanding Physicist and also an Astrophysicist. He is well known for ionization of matter by pressure in cold compact objects like planets. This theory is complementary to thermal ionization work done by Dr Meghnad Saha, his guru. When he became the Scientific Adviser to Defence Minister he established the Defence Science Centre which became the nucleus for generation of products and systems required by the Armed Forces.

Dr. Homi Bhabha carried out research relating to cosmic radiation. In 1939, he joined Sir C.V. Raman in IISc Bangalore. Later, he was asked to start the Tata Institute of Fundamental Research with focus on nuclear science and mathematical science, and established the Atomic Energy Commission in 1948. Multi-centres were born as part of BARC with his vision in nuclear science to nuclear technology, nuclear power, nuclear devices and nuclear medicine.

Prof Vikram Sarabhai, the youngest of the three, worked with Sir C.V. Raman in experimental cosmic ray. Prof Sarabhai established the Physical Research Laboratory in Ahmedabad with space research

as focus. In later years he became the Director of Space S&T Centre. The SSTC (1963) started with launching sounding rockets for space atmospheric research. Prof. Vikram Sarabhai unfurled the space mission for India in 1970 that we should build Satellite Launch Vehicle capability, to put our communication satellites in the geo-synchronous orbit and remote sensing satellites in the polar orbit. Also, he envisaged that launch vehicles built in India should be launched from Indian soil. This one visionary thought led to intensive research in multiple fields of science and space technology. Many of us had the fortune to be part of Prof. Vikram Sarabhai's vision. Today, India has the capability to build any type of satellite and launch it from its soil.

These three Indian scientists, all of them physicists, started physics research institutions that blossomed into defence technology, nuclear technology and space technology. When I study deep into their knowledge and the vision, I believe they would have realized that science has to be promoted through political systems. It is essential that technologies that give immediate benefits to the people directly or indirectly should be successfully put forward. The three great institutions have emerged with 20,000 scientists spread in institutions all over the country. Another important message conveyed by these three great scientists is that basic science is very vital for growth of technology and growth of scientific and technological human resource thereby transforming the society.

Particularly for young scientists who have assembled here, I am giving these role models so that when you are doing scientific research you always ask yourself, "Can my research and development task contribute to the upliftment of the people of my country?" It may be any area of research: medical science, physics, chemistry, space research, nuclear research, defence research, mathematical science, earth sciences etc. Particularly for a developing country like ours which has a vision for a developed nation, your contribution in the scientific field is all the more important.

Can Indian Science inspire youth?

I AM INDEED very happy to talk to you on this Science Day, which is celebrated on the 28th of February every year, the day one of our great scientists and Nobel Laureate Sir C.V. Raman made a landmark discovery. On this day, the nation pays tribute and expresses its gratitude to all the scientists who have made our dream of using the science and scientific discoveries as vehicles for economic development a reality. If the nation's science is celebrated, it will also attract many young children to take up science as a career. In addition, the scientists of the nation may like to rededicate themselves to create high quality scientific research output from India and make the nation proud. Science day is a day to remind us that the important ingredient for societal transformation would mainly come from science. I would like to share with you, particularly the youth, the scientific progress made in our country towards enriching the society and signifying our national spirit "Can Indian science inspire youth"?

One of the major breakthroughs in science in the 20th century that had an everlasting impact on humankind is the most celebrated work of Einstein. Einstein explained, for the first time in 1905, the principle of the inertia of energy as a universal law. The famous energy equation $E=MC^2$ was given to the world. This equation has become the basis for converting matter into energy giving birth to a new avenue called the nuclear energy for producing electricity to light up our cities and villages. Science at times is a double-edged sword. While the $E=MC^2$ of Einstein changed the way the humanity looked at the energy problem, it also paved the way for the design of Atom bomb. The latter application even today threatens to disturb the world peace. In spite of this, Einstein's work is most profound and opened up many areas of research and development in physics. The scientific community

of the world has decided to pay tribute to Einstein by declaring the year 2005 as the International year of Physics. As announced by me during the address to both the houses of Parliament on 25th February 2005, India will celebrate Einstein's anniversary by paying special attention to basic sciences in our schools and colleges, modernizing and reforming our institutions of science and, above all, rededicating itself to the spread of scientific temper. When I think of Einstein, I am reminded of the observation made by him about our father of the nation, Mahatma Gandhi : "Generations to come will scarcely believe that such one as this (Gandhiji) ever in flesh and blood walked upon this earth."

Let me refer to Raman Effect. Raman is one of the greatest scientists that India ever produced. Raman was extremely creative even with inexpensive equipment and in simple environments. One of his notable contributions to science is the discovery of what later came to be known as "Raman Effect". Raman Effect is the appearance of additional lines in the spectrum of monochromatic light that has been scattered by a transparent material medium. Sir C. V. Raman discovered the effect in 1928. The energy and thus the frequency and the wavelength of the scattered light are changed as the light either imparts rotational or vibrational energy to the scattering molecules or takes energy away. The line spectrum of the scattered light will have one prominent line corresponding to the original wavelength of the incident radiation, plus additional lines to each side of it corresponding to the shorter or longer wavelengths of the altered portion of the light. This Raman spectrum is the unique characteristic of the material medium. Thus, Raman spectrometry is a useful technique in physical and chemical research, particularly for the characterization of materials.

This in-elastically scattered light is called 'RAMAN SCATTER'. Energy difference between incident light and the Raman scattered light is equal to the energy involved in changing the molecule vibrational state. The Raman Effect is useful in the study of molecular energy levels, structure development and multi component qualitative analysis.

Raman Effect has continuously impacted every field of science. Its role in spectroscopy, medical diagnostics and material

characterization had been phenomenal. The Raman Effect had been used in many new areas of science, the most recent being in the development of a continuous silicon laser. Instruments and techniques based on Raman Effect make a huge industry all over the world.

In a paper published February 17, 2005 in *Nature*, Intel researchers disclosed the development of the first continuous wave all-silicon laser using the Raman Effect. They built the experimental device using the standard CMOS manufacturing processes.

Intel researchers incorporated a novel diode-like structure into the silicon cavity laser. This diode combined with the Raman Effect produces a continuous laser beam at a new wavelength. This breakthrough device could lead to many practical applications such as optical amplifiers, lasers, wavelength converters, and new kinds of highly efficient optical devices. A low-cost all-silicon Raman laser could inspire innovation in the development of new medical sensors and spectroscopy devices.

Over the next five to ten years, the computing and communications industries would face increasing challenges to deliver more data and faster. Consumers will be downloading full-length movies, not just photos and music files. People will also require faster access to these large amounts of data. While microprocessors are projected to meet these future demands, the bandwidth of the interconnects needs to be increased to meet the speed of the microprocessors. With the new work of Intel using Raman Effect to produce continuous silicon laser, the material convergence will take place very soon and faster networks would emerge.

Now, I would like to talk about another great Indian scientist, Dr. G.N. Ramachandran known as GNR amongst scientists. GNR's life is indeed an example worthy of emulation by all scientists, which was a fusion of curiosity, creativity and problem solving ability for successful missions. GNR was wondering how to go about with x-ray diffraction and x-ray crystallography base with application to biomolecules as a main theme. J.D. Bernal, the famous crystallographer and chemist who was on a visit to India in 1942 felt that all the structures proposed so far for collagen were unsatisfactory and suggested that

GNR could take a look at that. How to get collagen was indeed a big problem for GNR at that time. He presented his problem to Dr. Nayudamma, the then Director of CLRI. Within a few days, Dr. Nayudamma procured a tube full of collagen from Australia. This helped GNR to publish the first innovative paper on the collagen structure, which gave strikingly original triple helix—it appeared in the journal *Nature* on August 7, 1954. The proposed structure consisted of three separate helical chains, with their axis parallel to the fibre axis, stacked in a hexagonal array. This structure was not only innovative, it also provided better quantitative agreement with the X-ray data. Collagen is today finding large-scale application in the treatment of third degree burn injuries, since it has been found to have extraordinary healing properties. Also collagen has led to a separate branch of biology named structural biology, which is being taught in many universities. GNR can rightly be called as the father of structural biology. The world will always be thankful to him, for giving the famous Ramachandran plot.

Let me now discuss the glorious phase of Indian science. In India, science and technology in the pre-independence era, specifically starting from the thirties was influenced by the six great scientists of international repute. They are Sir C.V. Raman, Prof Chandrasekhar Subramaniam, S.N. Bose, J.C. Bose, Meghnad Saha, and Srinivasa Ramanujam. This phase, I consider the glorious phase of Indian science. The scientific foundation laid by them always stimulated the later generations also. This was also the beginning of the emergence of a confident India, in spite of her subjugation. The second phase is the post-independence phase of science and technology in India.

All of you know, in history, any country revolves itself initially around a few stout and earnest knowledge giants. Particularly I took interest to study the lives of three scientists, as I was interested in their scientific and technological leadership qualities that focused on the relationship of S&T and development of the nation. In the history of India, there may be many but I was very close to these three great personalities for one reason or the other. They are founders of three great institutions. I worked in two of the institutions directly and one in partnership. Dr D.S. Kothari, a Professor in Delhi University was

an outstanding Physicist and also an Astrophysicist. He is well known for ionization of matter by pressure in cold compact objects like planets. This theory is complementary to thermal ionization work done by Dr Meghnad Saha, his guru. Dr Kothari set a scientific tradition in Indian defence tasks when he became Scientific Adviser to Defence Minister in 1948; He created a Board of Advisors to the Scientific Advisor consisting of Dr. H.J. Bhabha, Dr. K.S. Krishnan and Dr. S.S. Bhatnagar. Later the Board was renamed as Scientific Advisory Board with enlarged membership.

He established the Defence Science Centre to do research in electronic material, nuclear medicine and ballistic science. He is considered as the architect of defence science in India. His race continued and was followed up with momentum working and contributing in the areas of strategic systems, electronic warfare systems, armaments and life sciences.

Now, let me discuss about Homi Jehangir Bhabha . He did research in theoretical physics in Cambridge University. During 1930-1939, Homi Bhabha carried out research relating to cosmic radiation. In 1939, he joined Sir C.V. Raman in IISc Bangalore. Later, he was asked to start the Tata Institute of Fundamental Research with focus on nuclear science and mathematical science, and established Atomic Energy Commission in 1948. Multi-centres were born with his vision in nuclear science to nuclear technology, nuclear power, nuclear devices and nuclear medicine. These science institutions established multi-technological centres, but basic science is the vital component.

Thirdly I will discuss about Prof Vikram Sarabhai, who was my Guru, the youngest of the three and he worked with Sir C.V. Raman in experimental cosmic ray research. Prof Sarabhai established Physical Research Laboratory (PRL) Ahmedabad with space research as focus. PRL was the cradle of Indian Space Programme. In later years he became the Director of Space S&T Centre. The SSTC (1963) started with launching sounding rockets for space atmospheric research. Prof. Vikram Sarabhai unfurled the space mission for India in 1970 that we should build Satellite Launch Vehicle capability, to put our communication satellites in the geo-synchronous orbit and remote

sensing satellites in the polar orbit. Also, he envisaged that launch vehicles built in India should be launched from Indian soil. This one visionary thought led to intensive research and development in multiple fields of science and space technology. Many of us had the fortune to be part of Prof. Vikram Sarabhai's vision. Myself and my team participated in India's first satellite launch vehicle programme to put the satellite in the orbit. Today, India with her 20,000 scientific, technological and support staff in multiple space research centres, supported by about 300 industries and academic institutions, has the capability to build any type of satellite launch vehicle to place remote sensing, communication and meteorology satellites in different orbits, and space application has become part of our daily life.

You have seen how visionaries of a nation bring about economic transformation and technological change. I would like you to emulate these visionaries, dream and work for transforming India into a developed nation.

So far, friends, I have discussed the great tradition of science, particularly physics on the day of discovery of Raman Effect. It is important for us. I talked to you last year about the achievements of Indian scientists in the year 2003. This is also very important to all of us to know. There are hundreds of scientific laboratories and R&D Institutions in space, defence and many other areas, and a number of universities. It is time that our scientific, technological academic institutions and universities should carry out an internal review and assess for themselves where do they stand in relation to academic institutions of excellence in the world. I will be very happy to discuss this issue with academic experts.

My team from Rashtrapati Bhavan indeed made a great search on the Internet and also scanned through Indian and foreign scientific journals. The team also contacted the scientists directly through tele-conference. After analysis, I thought of sharing with you six scientific research results of the year 2004 that will impact our society. Let me discuss these aspects.

First I would like to discuss about bio-pesticide development. Development of safe and sustainable alternatives to chemical insecti-

cides is absolutely essential as it has become a liability for good soil. A research mission has been taken up by International centre for Genetic Engineering and Bio-technology to isolate a bacterium from soil-dwelling nematode, which is highly pathogenic to insects. Sustained research and field trials during the last two years, at various locations in the country, of the formulation consisting of bacterium has led to successful optimized formulation resulting in a viable bio-pesticide. As reported, the formulation is effective in agricultural and horticultural insect pests like diamond back moth of cabbage and cauliflower, mealy bugs of citrus fruits and grapes and termites in teak plantation. White woolly aphid of sugar cane, which is a major factor in reducing the sugar production of Maharashtra, Karnataka and Andhra Pradesh, is effectively controlled by the bio-pesticide. Its efficacy is comparable to the chemical insecticide. This scientific research leading to technology has been transferred to a start-up bio-tech company Nirmal Seeds Ltd and it is marketed under the brand name, BIO PRAHAR. I am sure that this work will lead to improved food productivity in a very eco-friendly way.

Second achievement is the development of a drug for faster cure of tuberculosis. Modern medicine has always relied on newer scientific discoveries world over. Indian scientific research starts to focus on finding solutions to our problems, which can later on be applied to the people of other countries. In this regard, India has made a very significant contribution in developing a drug uniquely suitable for Indian ambience. One of the achievements comes from a laboratory of (CSIR) the Council of Scientific and Industrial Research. CSIR lab has developed a new therapeutic molecule for tuberculosis. This molecule has shown the potential to cure TB in around 2 months, as against the standard treatment of 6 to 8 months. This breakthrough is very important as we have a number of TB patients. After completing the pre-clinical studies, the molecule transformed into a drug is planned to undergo clinical trials in humans. It is commendable that the entire development has been done as a public-private partnership involving the Lupin, the three CSIR Laboratories, namely, Central Drug Research Institute, Indian Institute of Chemical Technology and National Chemical Laboratory, and the University of Hyderabad.

Third achievement is the development of a nano-tube filter. The scientists from Banaras Hindu University have devised a simple method to produce carbon nanotube filters that efficiently remove micro- to nano-scale contaminants from water and heavy hydrocarbons from petroleum. Made entirely of carbon nanotubes, the filters are easily manufactured using a novel method for controlling the cylindrical geometry of the structure. The work was supported in part by the Ministry of Human Resource Development and Department of Science and Technology in India.

The filters are hollow carbon cylinders several centimetres long and one or two centimetres wide with walls just one-third to one-half of a millimetre thick. They are produced by spraying benzene into a tube-shaped quartz mould and heating the mould to 900 degrees C. The nanotube composition makes the filters strong, reusable, and heat resistant, and they can be cleaned easily for reuse. The carbon nanotube filters offer a level of precision suitable for different applications. The experiments demonstrated that the filters may be useful in producing high-octane gasoline. They also can remove 25-nanometer-sized polio viruses from water, as well as larger pathogens, such as *E. coli* and *Staphylococcus aureus* bacteria. The researchers believe this could make the filters adaptable to micro fluidics applications that separate chemicals in drug discovery.

This is a classic application of the latest in science—Nano science—to age-old problem of water purification. If properly used, this can help in lessening the burden in our drinking water missions leading to the availability of safe drinking water that will result in minimizing the water borne diseases.

Fourth area, I would like to talk about is Gene Chip for curing heart diseases. Cardiomyopathy means “diseases of the heart muscle” which leads to heart failure or sudden death. There are three main types: Dilated, hypertrophic or restrictive cardiomyopathy. It progresses since childhood and the onset of the disease varies according to the family history. Although transplantation may be an effective strategy in these patients, its implementation is hindered by availability of donor as well as numerous ethical, social, economic and legal issues.

Similarly the mechanical cardiac assist devices are also not cost-effective for long-term usage in our population.

The Human Genome Project has increased the impact of genetics in medical science and practice. Genetics of cardiomyopathy remain unknown. Also, the molecular etiology is not known in many cases of cardiomyopathies affecting children as well as adults, with an annual incidence of 2-8 per 10,000 in the United States and Europe. Though there are reports on association of mutations in nuclear genome and cardiomyopathy, quite a number of cases do not show any such mutations. As there is a close relationship between the cardiac muscle contraction and energy metabolism, it is quite reasonable to speculate the role of mitochondrial DNA variations as possible cause of these cases. Recent reports have shown evidence in support of the role of mitochondrial mutation in the pathogenesis of cardiomyopathies in western population. There is no large sample study carried out so far to find molecular etiology of cardiomyopathy in Indian population.

The scientists from International Centre for Biomedical Sciences and Technology (Research & Applications), have reported several novel mutations that could be the possible cause of the disease, and some pathogenic mutations whose role is proved in other mitochondrial diseases, by sequencing the five unrelated individuals with severe cardiomyopathies. This is the first report of the mitochondrial DNA analysis of the cardiac patients from the Indian subcontinent. Fortunately the administering stem cell has found cure in AIIMS for the specific type of cardiomyopathy.

Fifth Area is about the development of a novel detection kit, NEVA-HIV to detect HIV (AIDS) in a drop of blood within three minutes. It is a single step test in which a drop of blood is mixed with a drop of a reagent on a glass slide. If the blood sample shows clumping, it is positive for HIV. This clumping of blood can be easily seen with the naked eye, hence the test is called the Naked Eye Visible Agglutination assay or NEVA. This test uses recombinant proteins consisting of a monovalent fragment of an anti-human RBC monoclonal antibody fused to a specific protein antigen derived from HIV. These

proteins cross-link RBCs in the presence of anti-HIV antibodies, which are present in the blood of HIV infected individuals. The test uses recombinant proteins consisting of NEVA-HIV in one of the very few tests in the world that can be performed on whole blood, even from a finger prick. Keeping in mind the practical constraints of HIV testing in our country, NEVA-HIV is an instrument-free test. In addition, the simplicity and rapidity of the test makes it suitable for use in a primary health centre of a village even in a remote part of our country.

The test has been evaluated at several national reference centres and has been found to have high sensitivity and specificity. This novel scientific development has been carried out by the faculty members of Department of Biochemistry, University of Delhi in collaboration with the Department of Bio-technology and Cadila Pharmaceuticals Ltd., Ahmedabad.

Sixth area is the discovery of binary millisecond pulsar. A pulsar is the remnant of a star which exploded, leaving behind a sphere made up of neutrons just 20 kms in size but weighing more than the sun. The pulsar emits a beam of radio waves which is seen from the earth as a pulse every time it rotates. These waves are very weak, when they reach the earth. In order to detect the pulsar, one needs the Giant Metre-wave Radio Telescope (GMRT). The Tata Institute of Fundamental research (TIFR) has built the largest radio telescope in the world in rural area near the village of Khodad, 80 km from Pune. Because of the unique capabilities of our GMRT, scientists from all over the world including USA and Canada visit the centre to conduct collaborative experiments. Our scientists played a leading role in the recent discovery of a new “Binary millisecond pulsar”. Astronomy had been the strong point of ancient Indian science. Discoveries like the one that has been made by the scientists of the National Centre for Radio Astrophysics of TIFR, is an important contribution for Indian science.

I have given you a brief account of six scientific results achieved by our scientists in the year 2004. A nation of billion people will certainly have many more achievements that will justify her being

ranked third in the world in terms of scientific manpower. The six illustrations, I gave above, are more to show that the Indian science is in the ascending trajectory. The Indian science fabric is very vast and all encompassing. The Indian science awaits all of you, youth to join her in the journey of progress and excitement. Definitely Indian science particularly the experience of experienced scientists should be available to inspire the youth who aspire to take up science as their mission.

Science has helped us to increase food productivity, create the white and green revolution, improve communication, produce electricity using nuclear science, enhance the quality of life, attempt novel things of use to humanity and leading us towards a healthier and happy nation. Thanks to science we live longer, have reduced infant deaths, and have overcome diseases more effectively. When I was a child one of the dreaded diseases in India was small pox. It hit every village and town, killed millions and left millions with pockmarks on their faces. Science came to our rescue. Now small pox is history, a disease of the past.

Can we apply science to eradicate the poverty, remove illiteracy, make all Indians healthy and make it a partner in generating wealth to the nation for transforming India into a developed nation by the year 2020 ? The answer to the question is “yes” since the development of the nation has to be done through application of technology since non-linear growth can only be achieved through technology. The development of technology needs science. If we desire to nurture the nation, we have to nurture science and scientists. Let us all work together to promote a scientific temper among our youth who are the greatest partners in the transformation process.

Attracting Youth for Career in Science

I AM INDEED delighted to inaugurate the seminar on “Attracting Young people to Careers in Science” organized by the Indian Physics Association on the occasion of the International Year of Physics - 2005. I greet the organizers, scientists, engineers, distinguished guests and the other participants in the seminar. Keeping in mind the main theme of the seminar, I would like to discuss with you about: “Challenge to science: Attracting the youth”.

I would like to narrate an incident which happened during a programme for honouring Prof. Norman E. Borlaug with Dr. M.S. Swaminathan award, at Vigyan Bhavan, New Delhi on the 15th of March 2005. Prof. Borlaug, at the age of 91 was in the midst of all the praise showered on him from everybody. First, he talked about India's advancement in the agricultural science and agricultural production and the present status of agricultural science in India. He turned to the dais; he talked about Dr. M.S. Swaminathan and a political visionary late Shri C. Subramaniam who were the prime architects of First Green Revolution in India. He also recalled about Dr. V. Kurien who was the father of White Revolution in India. Then he turned to the audience and started identifying scientists such as Dr. Raja Ram, a wheat specialist, Dr S.K. Vasal, a maize specialist, and Dr. B. R. Barwale, a seed specialist who was contributing in the agricultural advancement in India and abroad. Dr. Borlaug introduced them to the audience by asking them to stand and ensured that the audience cheered and greeted them with great enthusiasm. Here, I noticed a unique way of a 91 year old Nobel Laureate, who remembered and recognized all the key contributors to the agriculture mission irrespective of their position. This lesson, I would like the Indian scientific community to observe and follow, while dealing with all young scientists.

Let me tell you about another incident. Recently, my friend Dr. Vasant Gowariker sent me an executive summary of The Fertilizer Encyclopedia prepared by him and his team. The comment by Dr. Norman E. Borlaug on this document is noteworthy. I quote: “Asian farmers in particular must now judiciously increase their per hectare use of fertilizer, looking for greater efficiency in use and also in dealing with deficiencies of secondary and minor elements of the soil.” Unquote. This is how he sets the targets and provides encouragement for pursuing science across the world.

Another unique personality whom I remember, when I talk about science is Prof. C.N.R. Rao. I have visited his laboratory. He is a pioneer and an example of leading from the front. His research started from structure of molecules and that opened newer frontiers in surface sciences and more recently in nano particles and nano materials. He is one of the highly decorated Indian scientists. He is a motivator *par excellence* and pursues science with passion. Among the many awards he has received for his contribution in science, I would like to particularly mention the prestigious ‘Dan David Prize’ given to him by Dan David Prize Foundation headquartered at Tel Aviv University for his contribution towards the future time dimension in the field of material science. In addition, he is the first recipient of ‘India Science Award’ announced on 28 February 2005.

Another important scientist in the field of medicine, I would like to recall is Dr. P. Venugopal, Director, All India Institute of Medical Sciences, New Delhi. In his laboratory, he pioneered stem cell research in the field of cardiology. In one of the cardiac cases, where conventional medical and surgical treatment were ineffective because of the affliction of the heart muscle, stem cells implantation into the diseased heart muscles had been applied in order to improve the function of heart muscle. This kind of application of this procedure is the latest and very few cases have been done in the world, the first time in India. This is expected to open new frontiers in the treatment of patients for regeneration of heart muscles, thereby giving new hope for the patients suffering end stage heart disease. The commitment of Dr. P. Venugopal for research ultimately results in saving hundreds of lives.

I have mentioned these names only to assure ourselves that the Indian science has great future.

I remember an incident with Prof. Vikram Sarabhai during the 1960's. There were a few scientists and technologists, whom Dr. Sarabhai nurtured. I would like to share with you how he nurtured them. Whenever he came to Trivandrum, I used to discuss with him the proposal for the development of Composite Products. At that time I was in the initial stages of my career as rocket engineer, with less than two years of experience in ISRO.

Similarly, there was Dr. S.C. Gupta, a specialist in guidance and Dr. Amba Rao a specialist in Aerospace structures. In spite of our being just introduced into the organisation with a few years of experience, noticing our interest in development of certain materials and systems Dr. Sarabhai funded for the creation of laboratories. He created fibre composite laboratory based on my proposal, which later became Reinforced Plastic Centre. He created Gyro laboratory centred on the expertise of Dr. Gupta, which later became Guidance Laboratory and space structures laboratory centred around Dr. Amba Rao, which later became advanced dynamics group. These centres became the centres of excellence and incubated many advanced technology missions that fed critical inputs to space programme. Once the potential of the young scientist is understood, the heads of the organisation must invest on them boldly irrespective of the positions of the scientists and their age considerations. If this philosophy is pursued with sincerity the research would flourish and youth would be encouraged to embrace science.

In India, science and technology took a two-phase progress with the momentum created in 1930s, by the great scientists of international repute. They gave the country the confidence. We may remember the pioneering contributions to science made by Chandrasekhar Subramaniam for his Chandrasekhar limit and black hole, Sir C.V. Raman for his discovery of the "Raman effect", Srinivasa Ramanujan for his contributions towards number theory, J.C. Bose in the area of microwaves, and Meghnad Saha for "Thermo-Ionization Equation".

This phase, I consider the glorious phase of Indian science. This scientific foundation laid by them always triggered the later generations also. The unique similarities of all these scientists are that they had dedicated their entire life for the cause of scientific research and the spirit of inquiry for the fields that they have chosen amidst all the hurdles and problems in their life as well as their career. Science always gives life time missions to the scientists, and then only success comes. They have not deviated towards the other worldly prospects or towards their own career advancements. This quality helped them to make singular contributions for the benefit of science and the world. It is a question of dedication, commitment and understanding and also the environment for research in science, which gives birth to the scientists for the nation. They inspired many later generation scientists including G.N. Ramachandran, the originator of triple-helix.

Let me now discuss how India has attracted a large number of scientists and engineers towards drawing the road map for achieving self-reliance in critical technologies in defence, space and atomic energy.

In history, any country reposes its confidence initially in a few stout and earnest knowledge giants. Particularly I took interest to study the lives of three scientists, as I was interested in their scientific and technological leadership qualities that focused on the relationship of S&T and development of the nation. In the history of India, there may be many but I was very close to these three great personalities for one reason or the other. They are founders of three great institutions. I worked in two of the institutions directly and one in partnership. Dr D.S. Kothari, a Professor in Delhi University was an outstanding Physicist with special interest in Astrophysics. He is well known for ionization of matter by pressure in cold compact objects like planets. This theory is complementary to the epoch making theory of thermal ionization of his guru Dr Meghnad Saha. Dr D.S. Kothari set a scientific tradition in Indian defence tasks when he became Scientific Adviser to Defence Minister in 1948. The first thing he did was to establish the Defence Science Centre to do research in electronic material, nuclear medicine and ballistic science. He is considered as the architect of defence science in India. His race continued and was followed up

with a momentum working and contributing in the areas of strategic systems, electronic warfare systems, armaments and life sciences.

Now, let me discuss about Homi Jehangir Bhabha. He did research in theoretical physics in Cambridge University. During 1930-1939, Homi Bhabha carried out research relating to cosmic radiation. In 1939, he joined Sir C.V. Raman in IISc Bangalore. Later, he was asked to start the Tata Institute of Fundamental Research with focus on nuclear science and mathematical science. He subsequently established the Indian Atomic Energy Commission in 1948. Multi-centres were born with his vision in nuclear science to nuclear technology, nuclear power, nuclear devices and nuclear medicine. These science institutions established multi-technological centres, but basic science was the vital component.

The youngest of the three was Prof Vikram Sarabhai and he worked with Sir C.V. Raman in experimental cosmic ray. Prof Sarabhai established the Physical Research Laboratory in Ahmedabad with Space research as focus. In later years he became the Director of Space S&T Centre. The SSTC (1963) started with the launching of sounding rockets for space atmospheric research. His vision transformed Indian Space Research Organisation (ISRO) into multiple space technology centres. These centres are responsible for development leading to launch of PSLV in the sun synchronous orbit. And we have also witnessed a launching of GSLV in the geo-synchronous orbit with communication satellite.

I have talked about the three personalities, Dr. D.S. Kothari, Dr. Homi Baba and Dr. Vikram Sarabhai. All the three of them were physicists, who went on to build huge S&T institutions that became the home of more than 20,000 young scientists and engineers and also the kindler of their innovativeness. I believe strongly that if the three scientists had gone on to concentrate only on science, at least one of them would have got the Nobel Prize, but India would not have had the advantage of having the atomic energy, space and defence research establishments in the country with this magnitude. We must take the message and the mission of successful scientists such as Raman,

Chandrasekar, Kothari, Homi Bhaba and Sarabhai to the youth so that they will understand the various ways by which one could contribute to the growth of the nation, if they take science as a career. This would surely attract many young people towards science.

As soon as we became independent, the country was infested with problems to bring in urgently needed technologies for steel, civil structures, hydro dams and thermal power stations. Our concentration was directed towards solving burning problems like feeding the population, providing water, shelter and health care. The political visionaries at that time, in spite of our having a very weak economy, decided to wisely set up what ultimately has become the science base of our country such as Atomic Energy, Space, CSIR, DRDO, DST etc. The country also setup the powerful educational base including the creation of IITs and many universities, which had a unique blend of science and technology.

Today the country has become one of the strongest in the world in terms of scientific manpower in capability and maturity. Our economy has also become strong. Hence, we are in a position not only to understand the technologies that we may have to borrow, but also to create our own technologies with extensive scientific inputs of indigenous origin. This, in fact, would do a value addition. In many areas such as pharma, we are delivering to the world, products which are backed by large amount of R&D. Basically we have come a long way since our independence, from mere buyers of technology to those who have made science and technology as an important contributor for national development and societal transformation. In a world where the powers are determined by their share of the world's knowledge, reflected by patents, papers and so on, the WTO starts to play a crucial role in the economic development. It is important for India to put all her acts together to become a continuous innovator and creator of science and technology-intensive products. The science that we do today must have the innovativeness and the foresight and the vision for it to be the centre of the technology that we develop tomorrow for the competitive world.

In the last three decades, we have witnessed an unstinted growth in miniaturization of IT products in the world. Central to this is the

silicon technology. The feature size of the transistors has been decreasing relentlessly. It is predicted that the miniaturization using silicon micro electronics will find its plateau and its limit will be reached within the next decade. The world is on the lookout for an alternative to silicon. The transformation from microelectronics to the nano science and nano technology is knocking at our doors. The endless alternatives include molecular transistors, quantum computing, nano electronics and so on. India has the good science base needed for being a pioneer in making this breakthrough a reality.

In addition to the above, the challenges facing Indian scientists in the coming decades will be the development of anti vaccine for HIV/AIDS and development of seeds for agricultural products which requires minimum water and can provide high yield per hectare to compensate for the reduced availability of land. Apart from this, there is a need to work on thorium based nuclear power plants, integrated mission for stem cell research, launching of hypersonic reusable launch vehicle and take discoveries and innovations to provide better quality of life to the differently challenged people. These are some of the challenges facing the scientific community in the coming decades.

I would like to make the following suggestions for attracting the young people to careers in Science.

1. It is essential to have an assured career in science for a certain number of high quality committed scientists with aptitude towards research. There should be a minimum annual intake of about 300 M.Sc and 100 Ph.D scientists with proper emoluments and assured career growth in the organisations such as ISRO, DRDO, Atomic Energy, CSIR, DST and the Universities. The private and government funded universities must be encouraged to appoint M.Sc and Ph.D who have been selected through a nationally co-ordinated competitive selection process. This will be a great motivator for the science students and also their parents for pursuing advanced courses in science. This is the first and foremost need for attracting young people to career in science – an assurance to the youth and the parents that the future is secure, once they take science as a career.

2. The experienced scientists and policy makers of the organisations must recognize the talents available in the organisation irrespective of the position and empower the young scientists to create state-of-the art laboratories once they have concrete thoughts and vision. Prof Vikram Sarabhai in the initial stages of ISRO brought in a culture of management which encouraged and satisfied the vision of the young scientists who collectively succeeded in making the mission of the organisation a reality.
3. Universities and Research and Development institutions must encourage and facilitate the young scientists to write quality research papers in frontier areas and in prestigious journals. They should also facilitate the youth to present the papers in national and international seminars and symposiums which will enable them to assess their standard against international benchmarks. Encouraging youth to be lead authors while publishing the joint research would be a very good gesture that the youngsters would cherish for many years.
4. Based on my experience during my interaction with 600,000 students, I realize that they are looking for role models, whom they would like to follow after their 10+2 career. Approximately 7 million students appear for plus two examinations every year, out of which 3 million students are from the science stream. To attract this youth towards a career in science, we need many novel ideas. The youth must be made to understand the beauty of doing science, the pleasure of doing science and the ultimate bliss when the results of science make you understand the nature, master it, control it and finally make things that improve the quality of life of the humankind. Every one of us scientists must pledge that we will at least spend sometime visiting the schools to ignite the young minds by recounting our own experiences.

My best wishes to the organizers of this conference for fruitful discussions and generation of ideas for attracting young people with passion and aptitude for a life of science and in science.

Space Missions—Thinking Beyond Our Planet

I AM INDEED delighted to participate in the symposium on Launch Vehicles: Past, Present and Way Ahead on the occasion of the Silver Jubilee celebrations of the first successful launch of SLV-3. It was a great day 25 years ago that India became an exclusive member of the Space Club when SLV-3 E02 placed the Rohini Satellite in the near earth orbit. ISRO has come a long way today heralding self-reliance in space technology with capability to design and develop any type of launch vehicle and spacecraft. All of you assembled here and many others have contributed for making India a Space Power. I greet all of you for participating in this great event. On this occasion we remember the pioneering contributions of Dr. Vikram Sarabhai, Prof. Satish Dhawan, Dr. Brahmprakash, Shri M.R. Kurup and Dr. S. Srinivasan.

I was asking myself what thoughts I could share with such important space community. I know the dream of the people of India. I am also aware about their pain and sorrow. We are one sixth of the world's population, and at least two thirds of the global population is perhaps going through the same type of crisis and turmoil. Energy, water, health care, education and employment potential are the important requirements for the people to live with prosperity. The world at large needs technology inputs for meeting these needs. Space technology has a role. Therefore, I am going to discuss with you the *Vision for Space Missions* to find solution to these requirements using space technology.

India's space, missiles and aeronautics programmes in the last four decades have led to successful missions and accomplishments.

India is today self-reliant in space technology. It has evolved operational PSLV and GSLV which could provide competitive launch services. In the missile programme, India has operational strategic systems using critical technologies developed by indigenous efforts with multiple institutions partnership. The recent breakthrough has been BRAHMOS – a supersonic cruise missile, the best of its kind in the world attracting large-scale exports. Advanced Light Helicopter, Light Combat Aircraft, SARAS, IJT and Advanced Remotely Piloted Vehicles have established the aircraft design capability. Most of them are in production and marketing phase.

The vision of Dr. Sarabhai and Prof. Satish Dhawan with two space profiles 1970-1980 and 1980-1995 respectively were the blueprints and today those visions have become reality. With those space profiles of our visionary leaders and with the integrated technology strength of the nation, we can march further to envision new missions. Let us see the glimpses of space technology benefits.

Satellite remote sensing is vital for mapping of different ground resources like water, minerals, agriculture, urban planning, coastal regions, forestry, engineering geology and mineral exploration. Regional research centres in the many states / regions of our country and the multiple villages are utilizing the data coming from the satellite. This large potential must be effectively used.

In many places on our planet, we experience severe disasters like earthquakes, tsunami, cyclone resulting in loss of life, loss of wealth, and in some cases it destroys the decades of progress made by the country and its valuable civilizational heritage. India has earthquake problems periodically in certain regions. US, Japan, Turkey, Iran and many other countries also suffer due to earthquakes.

Earthquake/tsunami is a sub terrain phenomenon and predicting this from space observations would be a great challenge. Space scientists of multiple nations should work with determination to use satellite deep penetration images to predict the earthquake or shock wave propagation. Other possibilities are precise geodynamic measurement of strain accumulation by satellite to detect pre-slip, and electromagnetic phenomena prior to final rupture.

It is hoped that well organized electromagnetic monitoring may provide unique observational information on the pre-slips. Atmospheric/ionospheric anomalies still remains unresolved. Post earthquake disaster recovery, communication and damage assessment are also areas where space technology can quickly make its impact. We have to mount research programmes for evolving a systematic methodology for determining the effects leading to earthquakes and tsunami. Space technology can be used for forecasting and modelling of volcanic eruptions, land slides, avalanche, flash floods, storm surge, hurricane and tornadoes. We should also integrate the various efforts with the National Authority for Disaster Management.

Satellite communication network has helped India in providing education and health care in the form of tele-education and tele-medicine. The prime objective of the EDUSAT programme is to provide support to education through low-cost ground segments and to reach the unreached people of India in every nook and corner. EDUSAT is specially configured to have multiple beams covering different regions of India. EDUSAT provides communication coverage through five regional beams and a national beam. This system will be primarily for school, college and higher level of education; however it will also support non-formal education. EDUSAT is expected to provide 150,000 ground terminals in its full capacity.

Like tele-education, tele-medicine can help in a big way in bringing modern health care treatment within the reach of remote villages. I am happy to know that ISRO has used satellite network to connect remote villages to major hospitals wherein a patient's condition is diagnosed by a specialist doctor and his views communicated through the communication links.

These links would be the window to the world of knowledge for our villages and also to reap the benefits of our e-governance, tele-education, tele-medicine, e-commerce and e-judiciary initiatives. I visualize establishment of village knowledge centres in all Panchayats to empower the villagers with the knowledge and to act as a nodal centre for knowledge connectivity for the villagers. The knowledge centre will provide to the villagers the real time information about

the market for their products from the agriculture, cottage industry, fisheries and other rural industries in their locality as well as national markets. This also will provide direct quality employment to over one million people who will be instrumental in promoting higher level of wealth generation in our rural sector.

Due to various aerospace programmes, multiple state-of-the-art technologies got developed. Computational Fluid Dynamics (CFD) emerged as core strength for India with advanced software codes and super computing capability to optimize configurations for guided missiles, LCA and launch vehicles. CAD / CAM has become the order of the day for Aerospace systems, and virtual reality systems have been developed which reduce the design and product realization time by as much as 40%. India has developed fibre optic and ring laser gyros with better accuracies, micro processors, microwave components and devices, phase shifters, onboard computers and foundries for making VLSI and MMIC components thus making India self-dependent. In the area of propulsion, ISRO's large solid propulsion booster giving 500 tonnes of thrust, liquid propulsion in DRDO and ISRO, and the development effort of cryogenic engines, established a sound base in propulsion technology.

Emerging technologies such as MEMS, nano, information technology, biotechnology, space research, hypersonics and high power lasers and microwave will be dominating the future in every field and applications. The advancements in material science and technology will give a major thrust to the realization of advanced aerospace systems. We are today at the convergence of nano, bio and information technologies that will lead to new generation aerospace devices and products.

The advances in the fields of micro-electromechanical systems (MEMS) and nanotechnology have paved the way to the evolution in the ability to manufacture smaller and smarter products. MEMS bring together microelectronics with micromachining technology, allowing unprecedented levels of functionality and reliability to be placed on a small silicon chip. Nanotechnology, on the other hand, is the science of assembling atoms and molecules that respond to stimuli, with dimensions of the order of a nanometre (one in billion of a metre).

Micro Electro Mechanical Systems (MEMS) technology will have a profound impact in the aerospace field with the miniaturization of electronics. These tiny machines, often only a few micrometres in size, are already replacing conventional larger equipment. Given their microscopic size and weight, MEMS can use higher frequency and bandwidths and can be slipped into tighter and even more environmentally stressed locations. Once in production, unit prices are lower; once in operation, power consumption is negligible. Examples are pressure sensors, fluid flow sensors, magnetic sensors, gyros, accelerometers and more. MEMS is also expected to play a significant role in dramatically reducing the cost of space exploration with substantial savings in weight and increased reliability and functionality. Eventually, MEMS could lead to the development of extremely low cost micro satellites.

Molecular nano technology has enormous potential for future aerospace systems. Research has shown that newly discovered class of molecules, particularly carbon nano tubes built from graphite sheets curved into a wide variety of close shapes, may lead to tougher, high temperature materials that can survive in vacuum and other harsh environments. Carbon nano tubes are normal form of carbon with remarkable electrical and mechanical properties. It is hoped that such materials could revolutionize electronic design and open the space frontier by radically lowering the cost of launch to orbit.

Carbon nano tubes reinforced with polymer matrix will result in composites which are super strong, light weight, small and intelligent structures in the field of material science. This has tremendous aerospace applications.

Molecular switches and circuits along with nano cell will pave the way for the next generation computers. Ultra dense computer memory coupled with excellent electrical performance will result in low power, low cost, nano size and yet faster assemblies.

With the emergence of nanotechnology, there is convergence of nano-bio-info-technologies resulting in new devices which have wider applications in structure, electronics, health care and space systems.

The era of wood and bio-mass is almost nearing its end. So too the age of oil and natural gas would soon be over even within the next few decades. The world energy forum has predicted that fossil based oil, coal and gas reserves will last another five to ten decades.

Nuclear power especially a breakthrough in nuclear fusion may be a path. Concerted effort is called for for the conversion of thorium fuel to enriched uranium, for nuclear power is a must for self-reliance. Hydrogen fuel and solar rays are the two modes to get clean power. The solar rays, when passed through CNT-based solar photovoltaic cells utilizing nano-rods, will give efficiency of more than 50% from the present efficiency of less than 20%. Hydrogen in combination with fuel cell can replace fossil fuels used in automobiles. Hydrogen is a zero emission fuel facilitating pollution control and the process is regenerative. CNT multi-walled structures can store the hydrogen for power generation.

More than 70% of earth surface is having water; but only one per cent is available as fresh water for drinking purposes. Currently, more than half of the world's six billion population is without access to safe drinking water and sanitation. 20,000 children are affected every day due to polluted drinking water, more than the total mortality due to cancer, AIDS, wars and accidents. By the year 2030 when the world population touches eight billion, as many as seven billion will be living under conditions of moderate, high and extreme water scarcity. There is a fourfold method towards providing safe and fresh drinking water. The first is to re-distribute water supply; the second is to seek new sources; the third is to save and reduce demand for water; and the fourth is to recycle used water supplies.

In the programme of networking of rivers, remote sensing satellites can survey and evolve optimum water routes, environmental mapping and afforestation requirements, and continuous monitoring of the networked water flow through all seasons. This may require a dedicated satellite for our networked river systems.

Remote sensing satellites can provide the images showing the locations of the watersheds. From these watersheds, fresh water can be generated employing CNT based membrane through reverse osmosis

process. Another method of using space for solving the water crisis can be the use of solar power satellites. Energy obtained from such satellites can be stored in high energy CNT solar cells which provide the power to desalination plants for large-scale drinking water supplies in coastal cities.

Having missed the opportunity of the first industrial revolution, India is still a developing country. Now the developed countries are racing towards moon and Mars which may be the next industrial revolution. India has the opportunity now to join this exclusive club of nations to establish industry in moon and Mars. The technological challenges are:

- Manufacturing and mining in reduced gravity.
- Harnessing Helium-3 in moon for future energy, using oncoming fusion technologies.
- Using dry ice deposits in moon and Mars as source of fuel for rocket engine.
- Extending life of satellites in orbit through refuelling and repairing.
- Using the moon as space transportation hub.

As the space missions are increasing with larger payloads, it is essential to reduce the cost of access to space by several orders of magnitude. Such a reduction can enable the global space community to move out of the present era of information collection missions into an era of mass movement missions. They can find solutions for energy, water and mineral crises. Mankind will continue to live on earth for many billion years. We need good life for our generations. Therefore, it is necessary to bring resources the earth needs from other planets.

Integrated aerospace technology strength in multiple S&T organizations would lead to better capacity utilization, and the creation of low cost space transportation. We have to evolve innovative design concepts for both small as well as large payloads into space. Both single and two-stage to orbit RLV concepts can be examined. The

goal here is to reduce the cost of access to space by one to two orders of magnitude. Even a scientific breakthrough, for example, in air breathing propulsion system may lead to a space transportation revolution. The world space community has a huge stake in such breakthrough research in advanced inter-disciplinary and inter-institutional collaboration. A concerted effort is thus needed to quickly demonstrate the technology for low cost access to space. ISRO takes the lead in bringing the space community together.

The global space industry has had a forty-year period of unprecedented growth and prosperity. The geo-stationary orbit is nearly full, and new earth orbits need study and exploration, especially use of small satellites in equatorial low earth orbit. Currently, global space industry has a capacity to launch over 200 tonnes of satellites every year. However, the forecast is that projected demand will consume less than half of this established capacity. Thus a bitter price war is on to capture this limited market.

The Indian concept of Hyperplane, a fully reusable system is an innovation in rocketry providing a payload fraction of 15%, drastically reducing the launch cost. The concept of mass addition in space has been appreciated worldwide and a few countries have started working on the heat exchanger for on-board generation of liquid oxygen. There is an urgent need to progress the cost-effective SSTO hypersonic plane in our country.

With the growing space efforts, the coming years will have a dominance of reusable launch vehicle. They will provide cost-effective transportation of heavy payloads in order to construct large structures in space. The future needs will be solar power satellites for generation of electric power, exploration of planets, mining in moon and Mars and space habitats.

In the last 25 years, Indian space, missile and aircraft technologies have matured and have tremendous integrated potential for developing world class newer systems. While we are celebrating this silver jubilee, we must look forward to missions for the next 25 years. Therefore, I suggest the following space missions:

1. Manned Space Missions to Moon and Mars and establishment of space industry
2. Cost-effective space transportation systems using Hypersonic Reusable Vehicles (SSTO)
3. Harnessing Space energy for power and drinking water
4. Developing Solar Sail for inter planetary mission
5. Integrated Disaster Management – Role of space technology
6. Refuelling, Repair and Maintenance of Satellites in Geo Orbit
7. Operational Indian Navigational Satellites
8. International “Youth Power” connectivity satellite

Future space missions throw open new opportunities and challenges to the scientific community and the youth of India. Use this opportunity to make the nation great.

Thinking beyond our planet is an essential trait. The thought itself elevates the person. The person is transformed into a creative state. Creativity indeed is the foundation of discovery and inventions.

I recall the great saying of Maharishi Pathanjali in *Yoga Sutra* in 500 BC:

“When you are inspired by some great purpose, some extraordinary project, all your thoughts break their bounds. Your mind transcends limitations, your consciousness expands in every direction, and you find yourself in a new, great and wonderful world. Dormant forces, faculties and talents come alive, and you discover yourself to be a greater person by far than you ever dreamt yourself to be.”

Space has to become another place. This calls for cost-effective and reliable space transportation and manned missions.

Electromagnet Spectrum : Friend of Humanity

I AM DELIGHTED to participate in the inauguration of the General Assembly of the International Union of Radio Science (URSI). My greetings to the organizers, scientists, educationists, technologists and distinguished participants especially delegates coming from various parts of the planet. I particularly greet Dr. A.P. Mitra for his pioneering contribution to radio science. The domain of URSI extends throughout the solar system and out among the galaxies. I am sure that when man reaches the outermost limit of the observable universe he will be assisted by means of radio for communicating with earth from the space platform for navigation and control using electro-magnetic waves envisaged by Maxwell, J.C. Bose and Marconi about a century ago. In the eight decades of the existence of URSI, this is the first time the General Assembly is being held in New Delhi and offers an excellent opportunity to the radio scientists particularly young scientists to interact with international experts on state-of-the-art subjects. I have selected the topic “Electromagnet Spectrum: A Friend of the Humanity”.

When I see you friends, scientists and technologists of different disciplines connected with the electromagnetic spectrum, belonging to India and different countries assembled here, I am reminded of an event which took place on November 21, 1963, when I was a rocket engineer at Thumba. This was a very important day in the history of India’s space programme. On that day, the first sounding rocket from India was launched from Thumba with international co-operation. The rocket and payload was integrated in the Thumba Equatorial Rocket Launching Station (TERLS).

The rocket carried the sodium vapour payload to study the upper atmospheric winds and Longmuir wave probe to study the upper

atmospheric electro jet. This first experiment paved the way for many sounding rocket experiments, and TERLS was dedicated to the international scientific community for the unique experiments in the electromagnetic jet, as India was uniquely placed near electromagnetic equator to study electro jet and related phenomena in the ionosphere. The 1963 rocket launch from Thumba was my first experience with radio propagation and related studies. The starting of Thumba Equatorial Rocket Launching Station (TERLS) was the seeding of India's space programme. Since Prof Vikram Sarabhai was the founder of the Physical Research Laboratory at Ahmedabad which was spearheading the space research, TERLS became the laboratory for space experiments.

Here I would like to mention the contribution of Prof Vikram Sarabhai who worked on experimental cosmic ray, Dr. Homi Jegangir Bhabha who carried out research relating to cosmic radiation and Dr. Kothari who is well known for his work on ionization on matter by pressure in cold compact objects like planets. Apart from their contribution in their areas of specialization, Prof Vikram Sarabhai sowed the seeds for ISRO, Dr. Homi Jegangir Bhabha, architect of nuclear science, created the Department of Atomic Energy and Dr. Kothari was the architect of defence science in India. We are proud of the contribution made by these three physicists in building three great scientific and technological institutions to nurture and grow science and technology in our country. Today the space programme through its sounding rocket programme and geosynchronous satellite programme is contributing for India's communication covering the major electromagnetic spectrum.

In the early days of space programme, for overseas communications, we used to have wireless communication link between Trivandrum and Mumbai for onward connectivity to the rest of the country and outside world. Similarly, in the early phase of missile programme, the communication link between Hyderabad and Chandipur, Balasore was also through wireless sets. In fact, the entire operational communication systems between Wheeler Island, Main Land, Balasore, SHAR, Down Range Ships and Car Nicobar were through HF wireless communication links. These communication facilities made me understand the value of robust noise-free radio communications and

the role of scientists and engineers in realizing these systems for real application.

Recently, I participated in the award ceremony of Shankar's International Children's Competition at New Delhi. There I found the visualization of a 13 year old girl named Aardhra Krishna on how the earth's civilization will look like around 3000 AD. In her imagination, the citizens are forced to migrate to Mars and have made Mars the home to a flourishing civilization. This advanced civilization, which was man made, comes suddenly under threat created by nature in the form of an asteroid of Jupiter. The asteroid from Jupiter orbit was coming towards Mars and Mars was in danger of extinction. The scientists on Mars come up with a very innovative plan of a barrage of nuclear cannons to attack the oncoming asteroid. The bombardment destroys the asteroid and the year 3000 sees a Martian civilization surviving from the fury of the nature by an innovative scientific application. What a wonderful scientific and technological thinking of the young mind? Will it all be possible without the availability of radio science which transmits large amount of information encompassing the entire solar system? When I was admiring this imagination of the young student, a real time space experiment took place that gave some meaning to the imagination of the youth.

On 4th July 2005 one important event took place in space. That was the impact of the NASA spacecraft called "Deep Impact" smashing into the comet Tempel-I, with enough force to create a football stadium sized crater with a depth of a 14 storey building. The spacecraft was navigated through a ground control system by an Indian, Shyam Bhaskaran – the "Deep Impact" travelled 431 million kms in 172 days escaping from the earth orbit and intercepted the comet at a straight distance from earth at 134 million km. The comet was orbiting around the Sun every five and half years. This is a landmark in radio communications and space exploration.

This event is an important milestone to develop standardized technique for combating asteroids which may hit the earth in future. One such large asteroid (1950 AD) is predicted with certain probability to hit the earth on March 16, 2880 AD and nearly one third of the

earth would be damaged. Like the “Deep Impact” many spacecraft will be required to be sent with high energy material particles to divert or break the asteroid to move it out of the dangerous orbit. All this is possible only if we have a reliable robust radio communication system.

One of the important areas of application of radio science in India is the discovery of binary millisecond pulsar. A pulsar is the remnant of a star which exploded, leaving behind a sphere made up of neutrons just 20 km in size but weighing more than the sun. The pulsar emits a beam of radio wave which is seen from the earth as a pulse every time it rotates. These waves are very weak when they reach the earth. In order to detect the pulsar, one needs facilities like the Giant Meter Wave Radio Telescope (GMRT). The Tata Institute of Fundamental Research (TIFR) has built this largest radio telescope in the world in the rural area near the village of Khodad, 80 km from Pune. Because of the unique capabilities of our GMRT, scientists from all over the world, including USA and Canada, visit the centre to conduct collaborative experiments. Our scientists played a leading role in the recent discovery of a new “Binary millisecond pulsar”. Discoveries like the one that has been made by the scientists of the National Centre for Radio Astrophysics of TIFR, are an important contribution for our radio science. Particularly I greet the team led by Prof Govind Swarup.

In many places on our planet, we experience severe earthquakes resulting in loss of life, loss of wealth and in some cases it destroys the decades of progress made by the country and its valuable civilizational heritage. India has earthquake problems periodically in certain regions. Recently, in our state of Jammu and Kashmir and the neighbouring country, there was an earthquake. US, Japan, Turkey, Iran and many other countries also suffer due to earthquakes.

Earthquake is a sub terrain phenomenon and predicting this from space observations would be a great challenge. An earthquake phenomenon in broader sense starts to produce some precursors before the final rupture, although this precursor-generating pre-rupture stage is not usually regarded as part of an earthquake. The question is whether such precursor really exists or not. So-called pre-slip envisaged in

the dynamic models of earthquake source is also a good theoretical possibility but its observation appears difficult. Precise geodetic measurement by GPS may succeed in the detection of the pre-slip. It seems that electromagnetic phenomena prior to final rupture may be promising.

According to new concepts earthquakes occur when the crust reaches a critical state, emission of electromagnetic signals before final rupture is theoretically plausible, notably in the ultra low frequency (ULF) range and very low frequency (VLF) range.

It is hoped that well organized electromagnetic monitoring may provide unique observational information on the pre-slips. Atmospheric/ionospheric anomalies still remain unresolved. Post earthquake disaster recovery, communication and damage assessment are also areas where space science and communication technology can quickly make its impact. I am sure radio scientists will definitely be keen to establish the co-relation between the occurrence of earthquake and the electromagnetic disturbances noticed in the specific region.

It is important to mention and acknowledge the contributions made by the Amateur radio operators called HAMs, who started using radio communication technique particularly the shortwave for long distance communication through the ionosphere during the first decade of 20th century. The experience of HAMs has been used for remote area, disaster management and emergency communication world over during the last hundred years. NASA, ISRO and other space agencies have honoured the HAMs by launching exclusive satellite for them so that they can continue to contribute in the latest trends of satellite communication. During the recent Tsunami it was a coincidence that a Government of India approved amateur radio expedition was in Andaman and was operational during the disaster and provided vital communications to the mainland and Indonesia for getting latest updates on the movement of Tsunami waves and rescue operations. The contributions made by Indian HAMs in this Tsunami have been acknowledged at national and international level. Amateur radio and remote area communication are synonymous with emergency communication. It is advisable to promote this hobby to set up amateur

radio stations in Panchayat offices, schools and hospitals by voluntary agencies who will be able to locate and operate the HAMs throughout the day and night, on all days. Each Panchayat must encourage this hobby and can make it as a part of the village knowledge centre. This will act as an early warning system for the village community in case of an unforeseen eventuality. At this hour, I would like to remember fondly the significant contribution of the Late Dr. Shrikant Jichkar in promoting HAMs in India.

Commercial radio communication system operates with high power, frequency diversity with large antenna to improve the reliability of communication. HAMs work with limited power under man-made and natural radio interference and work in difficult circumstances. There is a lot of scope to improve narrowband communication technique in multi hop HF communication to remote areas such as Antarctica and Arctic to improve the quality of HAM communication. The members of the radio science community can definitely assist the HAM operators through research in establishing low cost narrowband communication techniques.

India is in the mission of transforming into a developed country. Many developed countries are racing towards Moon and Mars which may lead to the next industrial revolution. We also have the opportunity of joining this exclusive club of nations to establish industry in Moon and Mars with our core competence in space science and technology. The technological challenges are:

- Manufacturing and Mining in reduced gravity.
- Harnessing Helium-3 in Moon for future energy, using oncoming fusion technologies.
- Using dry ice deposits in Moon and Mars as source of fuel for rocket engine.
- Extending life of satellites in orbit through refuelling and repairing.
- Using the Moon as space transportation hub.
- Building human habitats on the Moon, Mars and also in outer space.

- Above all, it is essential to establish reliable space communication systems that will work during all ionospheric disturbances and sunspot activities.

Characteristics of moon have a vital implication for space science. As civilization spreads to Mars in five to eight decades, the Moon will provide the main link between earth and her scattered children. The earth's ionosphere reflects all but the shortest radio waves back to Earth. Earth's dynamic atmosphere prevents the use of lasers for communication into space. On the near airless Moon, this would not be a problem, for the Moon's sky is perennially clear to waves of all frequencies.

Thus the Moon will soon become a "Telecommunications Hub" for interplanetary communications, aiming its tightly focused laser beams to other planets and ships in space. With interplanetary communication systems located on the far side, the Moon would also shield these communication stations from the continuous radio emissions from the earth. The far side of the Moon would be the quietest place within millions of kilometres from the earth, in the sense of radio silence. The coming few decades will provide a great challenge to the radio scientists.

Since a large number of radio science specialists have assembled here I would like to make the following seven suggestions to this scientific community which will be useful to the entire mankind.

- (1) There has been a revolution in communication science and technology all over the world. The result of this revolution has to reach the common man. This can be in the form of providing affordable high bandwidth tele-communication to every villager, such as mobile phones with GPRS/CDMA, satellite and FM radio and IP communication. Research is required to bring down the cost and make this revolution reach seamlessly to six billion people of the world.
- (2) The power of radio communication needs to be utilized for improving the educational standards of our rural masses. Recently, I was addressing the students of three universities

in three different regions of the country from Rashtrapati Bhavan. While organizing this event I found that the connectivity to various corners in the country is yet to become seamless. The radio and space communication specialists have to work together to make high bandwidth seamless connectivity for the tele-education programmes to reach our distant villages with ease through broadband communication.

- (3) There are possibilities of correlation between the seismic activities and electromagnetic activity in the particular region. There is a need to have a comprehensive study on the subject. This study should also be linked with the study of other geophysical parameters relevant to an earthquake. This will be a great contribution of the radio science community to mankind towards disaster mitigation.
- (4) India is in the process of establishing three Science centres in different parts of the country to create a scientific research cadre. The URSI can evolve a possible curriculum for study and research in the electromagnetic spectrum in these advanced centres.
- (5) I understand that the adaptive radio and software radio are among the thrust areas of wireless communication technologies. In this connection, it is essential for the radio scientists to provide a solution for getting high bandwidth communication in the wireless spectrum in a mobile environment for an optimal distance without the constraints of line of sight.
- (6) Radio scientists and technologists should continue to strive for optimum and bandwidth efficient communication techniques even when higher frequency bands like millimetre waves, sub-millimetre waves and quasi optical waves have started becoming available; there is not much congestion at this stage in this frequency band, but the ever increasing use of radio frequencies spectrum needs evolution of an allocation criteria.

- (7) Solar power satellites may become a reality in a few decades. Because of its potential for transmitting large volume of power in Gigawatts, the possible electric power transmission is through microwave to the earth. Research is essential to find out the relationship of transmitting frequency with atmospheric structure.

I find that radio science embraces all areas of human activity such as provision of cost-effective communication to all the citizens, education, health care, development, disaster mitigation, earthquake forecasting and solution to energy problem. In overall perspective, connectivity is the key for the growth of the humanity. Hence, radio scientists have a major role to play with their continuing research in promoting economic prosperity to the planet Earth through uninterrupted connectivity. My best wishes to all the participants of the General Assembly of International Union of Radio Science in their mission of making electromagnetic spectrum a friend of humanity.

Global Human Development Cadre for India

I AM DELIGHTED to participate in the inauguration of the Global Conference on India R & D 2005 – The World’s Knowledge Hub of the Future. I greet the organizers, researchers, scientists, technologists, education planners, industry captains and other distinguished participants of the Conference. I am happy to know that the Conference aims at projecting India as a cost-effective knowledge hub of the future and at stimulating investment in terms of more R & D centres being set up in the country. The resultant collaborative and cost-effective research will lead to affordable and responsive technologies for the larger good of the humankind. The topic of my discussion today is “Missions for Knowledge Hub”.

The important components needed for the evolution of knowledge hub are: Attracting youth for science learning and career, focussed national R&D programmes, urge for the industry to become internationally competitive and the need for the electronic and knowledge connectivity through four Grids.

Since my assuming office, I have visited all the States and many Union Territories. During these visits amongst the many people I meet, there will always be young students. I have so far met around 800,000 students, majority of them in the high school below 17 years of age. I have also met the parents of the students. When I meet students, I always ask them, whether they would like to take science as a mission. In a gathering of 1000 students, drawn from geographically distributed schools, I have never found more than 20 students enthusiastically answering that their mission in life would be science.

Address during the Inauguration of the Global Conference on “India R & D 2005 : The World’s Knowledge Hub of the Future”, Vigyan Bhavan, New Delhi, 7 November 2005

For example, on 3rd October 2005, I was inaugurating the Virtual University programme of the Universities of Kolkata, Chennai and Mumbai through a tele-education delivery system from the multimedia studio of Rashtrapati Bhavan. During my interaction with the students, Ms. Arunava Roy, of 1st Year – Biotechnology from the University of Kolkata asked me the following question:

“A majority of the bright students at the high school level aspire to become a doctor or an engineer. How can these rich minds be motivated towards taking up research as a first grade career option?”

This question is indeed the reflection of the feelings of most of the students who are in the 10+2 stage. We have to find the right answer. I have had many discussions with parents also. The parents spend almost all their earnings in order to educate their children, since they see the education as the best way of promising an assured career. They even go to the extent of sacrificing their personal luxuries and get loans to educate the children. The only vision they have in their eyes is to see well-settled sons and daughters with guaranteed profession. They see this happen if their children pursue a degree in Engineering, Management, Medicine or administrative services. They do not see the pursuit of pure sciences and research guaranteeing this.

This, I consider as an important area of concern of the nation and it needs the attention of the scientific community as a whole. In my view, we can initiate the following actions.

It is essential for the nation to assure a career for those who wish to pursue science as a mission. This will attract many students with the full support of the parents. We should work for the creation of a science cadre, with well defined growth path and attractive salaries. There should be a minimum annual intake of about 400 M.Sc. and 200 Ph.Ds with assured career growth in the organisations such as ISRO, DRDO, Atomic Energy, CSIR, DST and the Universities. Similarly, private sector industries in pharma, IT, oil and natural gas, power, transportation, agriculture should be able to attract additional four hundred M.Sc. and two hundred Ph.Ds every year for carrying out research on frontier areas of science and technology.

Now I would like to discuss some of the key areas of research and development, which will have global implications and also meeting the national requirements.

The world market in 2004 for nano materials, nano tools, nano devices and nano biotechnology put together is over hundred billion dollars. It has been noticed that the fastest growing area among these is nano-biotechnology.

Carbon nano tubes and its composites will give rise to super strong, smart and intelligent structures in the field of material science. Nano-biomedical sensors will play a major role in glucose detection and endoscopic implants. Drug delivery system will revolutionize the health care to a large extent.

Molecular switches and circuits along with nano cell will pave the way for the next generation computers. Ultra dense computer memory coupled with excellent electrical performance will give the society low power, low cost, nano size and yet faster assemblies.

The last four decades have also affected the packaging concept. Electronics packaging of the past has given way to the present microsystems packaging and the shift in the trend is now towards the futuristic nano packaging. We have to choose our own area of research and participate in the nano science technology revolution, which is just round the corner.

Energy independence has to be our nation's first and highest priority. We must be determined to achieve this within the next 25 years, i.e by the year 2030. This one major, 25-year national mission must be formulated, funds guaranteed, and the leadership entrusted without delay as public-private partnerships to our younger generation, now in their 30's, as their lifetime mission in a renewed drive for nation-building. One of the key areas of research is improving the efficiency of solar photovoltaic energy system.

Presently, silicon photovoltaic cells work with an efficiency of 13% to 15%, whereas research has already shown promise of achieving 50% efficiency in solar photo voltaic cells with CNT and silicon bonding.

This is an important work, which will revolutionize the use of solar energy for meeting the energy demands of many countries in the planet. Presently, Rashtrapati Bhavan is working on a project for creation of a five-megawatt solar energy power plant for meeting the energy needs of the Rashtrapati Bhavan. The capital cost of this unit will work out to approximately Rs. 100 crore. If the high efficiency photovoltaic cell is available the cost of the plant will come down by 60% in addition to substantial reduction in space utilization and the structure created for the plant. Thus, this research is a vital area for getting cost and space-effective solar power plants in India and in other countries. Educational institutions, R & D organizations and the industry should mount a mission mode programme to realize quantity production and marketing of the high efficiency CNT based photovoltaic cell within the next three years. In notional terms there will be a minimum saving of two lakh crore rupees in capital cost for establishing 50,000 megawatts of solar power out of 100,000 megawatt of power from renewable energy sources required for realizing energy independence in the country.

Nanotechnology for Cancer Treatment: Nanotechnology can find application in spotting cancer earlier than it can be done now. It can also enable highlighting tiny clusters of cancer cells and help the doctors detect whether cancer has spread or shrunk in response to treatment without the need for surgery. The third application could be to send the drugs encased in packages small enough to slip through cancer cell walls, kill tumour without damaging healthy cells thus reducing the side effects of treatment. All these areas are promising applications and there is a need for the oncologists, pharmacologists, nano-science and technologists to work together and make such drug and drug delivery system through nanotechnology a reality in a time bound manner.

Nuclear power generation has been given a thrust by the use of uranium-based fuel. However there would be a requirement for a tenfold increase in nuclear power generation even to attain a reasonable degree of energy self-sufficiency for our country. Therefore it is essential to pursue the development of nuclear power using Thorium, reserves

of which are huge in the country. Research and technology development has to be accelerated for Thorium-based reactors since the raw material, Thorium, is abundantly available in our country. Also, nuclear fusion research needs to be progressed with international co-operation to keep that option for meeting the large power requirement, at a time when fossil fuels get depleted. This research will be useful for many countries in the world. From Indian point of view we will be able to realize the goal of producing at least fifty thousand megawatt of power through nuclear source.

Presently, the oil yield from the seeds of bio-fuel plants is just around 30% of the seed weight. Intensive research is required to increase the oil yield from the present 30% to at least 50%, which will enable the reduction in basic cost of bio-fuel per litre from the existing Rs. 20 to around Rs. 12. This reduction will also provide adequate incentive to the farmer for cultivating bio-fuel plants in the field for generating large revenue compared to what he is getting now. This research will enable the country to save an additional Rs. 10,000 crore in foreign exchange, which is being now incurred for importing fossil fuel. Intensive research is also required to burn bio-fuel in internal combustion engines with high efficiency. This also is an urgent R&D programme.

It is reported that in India the number of HIV infected people is on the increase. It is critical that the transmission of HIV infection is prevented. An effective vaccine that can prevent this disease will be a cost-effective tool for control of infectious diseases. There are three sub-types of viruses classified as A, B and C. I understand that Indian population is largely affected by sub-type C virus.

There are two candidate vaccines presently considered for use against sub-type C virus in our country. In view of the urgency of finding a cost-effective vaccine, the expert group reviewed the vaccine candidate for HIV sub-type C in the pipeline. Adeno-Associated Virus (AAV) based vaccine with HIV-1 sub-type C (African strain) developed by Targetted Genetics Corp, USA was found to be in advanced stage of test in different parts of the world. This HIV vaccine (tgAAC09) is

now undergoing Phase-I trial for safety and immunogenicity assessment in healthy HIV uninfected volunteers at National AIDS Research Institute, Pune.

The Indian vaccine has been developed by scientists from National Institute of Cholera and Enteric Diseases in collaboration with National Aids Research Institute, Pune and Therion Biologics, USA. This is a recombinant vaccine containing six genes from HIV 1-C strain. This vaccine was developed from the virus isolated from National Aids Research Institute, Pune. This will go into Phase-I trial in healthy uninfected adults at Tuberculosis Research Centre, Chennai during this year. Both these programmes are being progressed as a joint venture between ICMR, National Aids Control Organisation (NACO) and International Aids Vaccine Initiative. In addition to these two vaccines a DNA based vaccine and SFV vaccine are also under development.

Time has now arrived to take up this development in a mission mode so that an effective vaccine will be available for our country within the next two years. Simultaneously, I would suggest that the medical community must start working on the development of anti-vaccines for sub-types A and B also.

Aerospace Vision: With our national strength and opportunity for larger demand in aerospace systems and export potential, a large business for industries is in front of us. It is essential that this strength be integrated into a National Aeronautics Policy for integrating the strengths of both civil and military aviation sectors to bring synergy in the aviation sector. Implementation of this policy will usher in an era of high technology and high skill industry environment resulting in generation of assets, wealth and employment opportunities in the country. National Aeronautical Policy is being progressed now; I am sure that it will lead to the formation of Aeronautical Commission. Design, development and production of 200 seater aircraft and the hypersonic reusable vehicle are the important missions in front of the nation.

Passenger Jet Aircraft: A study undertaken by the committee of experts on India's vision 2020 has come out with a large potential for aircraft to be produced in India. The technology vision document has concluded that it will be economically viable to produce a 150-seater aircraft in India. What is needed is to integrate the strength available in the country in a mission mode. With technology partnership between aerospace industries and academic institutions the Indian made passenger aircraft will become a reality.

The development of passenger aircraft calls for many complex technologies to be mastered. For example, the improvement of fuel efficiency using unducted fan is a great challenge. Identifying international collaborators and partners for joint development of many appropriate technologies at the initial phase itself would be required. This will also increase the potential for marketing in the international scene as well. This will be another area of research and development urgently needed for giving a fillip to air transportation industry.

Hypersonic reusable launch vehicle is an emerging area to achieve greater speeds using Ramjet and Scramjet engines. A study has been presently carried out for an air launched reusable hypersonic vehicle flying at an altitude of 30-40 km. in cruise mode at mach 7 to a range of 2000 km and fly back to the launch point.

This type of missions will be highly useful for multiple applications. In the case of Hyperplane, the aim was to achieve larger payload fraction. The space shuttle of USA with 2000 tonnes take-off weight could launch only 30 tonnes in low earth orbit, giving a payload fraction of 1.5%. India's concept of Hyperplane aims to realise 15% of payload fraction. This will considerably reduce the launch cost per mission and will enable multiple missions such as transport, reconnaissance, payload delivery, satellite injection etc. A typical mission of Hyperplane takes off with 100 tonnes weight using fan ramjet engine, works on scramjet mode for nearly 1000 sec. during which time it collects the left over air, cools it and separates as liquid oxygen. This increases its weight to 166 tonnes, thereafter it flies in rocket engine mode

using the liquid oxygen and stored liquid Hydrogen to deliver a payload of 15-16 tonnes. This concept of mass addition in flight is unique and conceived by Indian scientists. Hypersonic Technologies include scramjet propulsion, air liquefaction, high temperature materials, guidance control and software package. I visualize space transportation to become a reality within the next two decades. Some countries have already started booking places on the moon. It is essential to visualize the future and embark on a collaborative programme for making hypersonic reusable launch vehicle a reality.

For India to become a leader in the knowledge era, it is necessary to have revenue per capita almost increased by an order of magnitude. To achieve this our software industry has to move up the value chain and come up with innovative products that will have an order of magnitude commercial impact in the international market. I am confident that the Indian IT Industry is capable of undertaking such mega missions. Development of knowledge products should become the prime focus of exclusive R & D Units created as joint venture projects. The aim should be to capture at least 15% of the global business volume in the ITES (IT enabled services) and BPO sectors around 200 billion dollars out of 1.2 trillion dollars. Software products account for 260 billion dollars of global business. At least we should work for a market share of 10% in the beginning. Hence the total market share for India should be 200 plus the additional 26 billion dollars.

So far we have discussed some of the important R&D programmes in various sectors of the knowledge society towards meeting the national development requirements. Now I would like to talk about the connectivity mission needed to bridge the components of the knowledge society and enable the nation to develop and produce the products in a cost-effective manner.

The electronic connectivity for one billion people must transform into a network and provide a seamless access between knowledge creator, converter of knowledgeable products and the knowledge consumers. This can be achieved through the creation of knowledge grid, health grid, governance grid and PURA grid.

To maximize the synergy between the grids, leading to maximization of GDP and productivity, there is a need for inter-grid connectivities, which may be called as societal grid. Knowledge sharing, knowledge utilization and knowledge re-use is very vital by all constituents of the society for promoting non-linear growth. Societal Grid consists of:

1. Knowledge Grid – Inter connecting universities with socio-economic institutions, industries and R&D organizations.
2. Health Care Grid – Inter-connecting the Health Care institutions of Government, Corporate and Super specialty hospitals. Research institutions, educational institutions and ultimately, Pharma R & D institutions.
3. E-Governance Grid – Inter-connecting the Central Government and State Governments and District and Block level offices for G2G and G2C connectivity.
4. PURA Knowledge Grid – Connecting the PURA Nodal centre with the Village knowledge centres and Domain service providers. Since this is the backbone for rural development, all other Grids will infuse the knowledge into this Grid for sustainable development, health care and good governance. For example, five of the Periyar PURA villages have now connected using Wi-MAX connectivity.

Integrated village knowledge centres will act as an inter-connected delivery mechanism for tele-education, tele-medicine and e-Governance services apart from individual access by the people, within and between the Village Knowledge Centres through the PURA Grid.

Bandwidth as an infrastructure: In order to make the country the most advanced knowledge society, we should aim at making the bandwidth available without hindrance and at no cost. Making the bandwidth available is like the Government laying the roads. Movement of materials through these roads creates wealth in the industrial economy and the government recovers more than the investment on the roads

by way of taxes and enhanced prosperity of its people. In the modern digital economy driven by knowledge products, bits and bytes traverse the network and create wealth and this will recover the cost of investments in the bandwidth. Cost-effective creation of the four Grids and inter connectivity between Grids is the profound platform for collaborative research, development and deployment.

In the 21st century, India needs a large number of talented youth with higher education for the task of knowledge acquisition, knowledge imparting, knowledge creation and knowledge sharing. At present India has 540 million youth under the age of 25 which will continuously be growing till the year 2050. Keeping this resource in mind, the Universities and educational systems should create two cadres of personnel: (1) a global cadre of skilled youth with specific knowledge of special skills and (2) another global cadre of youth with higher education. These two cadres will be required not only for powering the manufacturing and services sector of India but also will be needed for fulfilling the human resource requirements of various countries. Thus, the universities will have to work towards increasing the throughput of the higher education system from the existing 6% to 20% by the year 2015, 30% by the year 2020 and 50% by the year 2040. The other Indians who are not covered by the higher education system should all have world class skill sets in areas such as construction, carpentry, electrical systems, repair of mechanical systems, fashion design, para-legal, para-medical, accountancy, sales and marketing, software and hardware maintenance and service, software quality assurance personnel etc. No Indian youth should be without either a world-class higher education or without world-class skill sets. This is the mission, which must be undertaken by all our Universities and the educational systems. We have to start right now to realize this goal since the overall time available for such an educational growth is short. A National Policy for creating a “Global Human Development Cadre for India” has to emerge.

So far I have placed my thoughts before you. Finally, I would suggest to the research and development community assembled here

to discuss the following questions during the deliberations in the conference.

1. How do you relate solving the problems of the people of the country to Research, Development and Production?
2. How do you contribute at the Global level in giving competitive edge, wealth and prosperity?
3. What are the problems, suggestions and solutions: Water, Energy, Health care, Education, Employment and Livelihood?

My best wishes to the members of the Global Conference on India R & D 2005 – The World's Knowledge Hub of the Future for success in their mission of making India a preferred destination for carrying out research needed for societal transformation of the planet Earth.

Digital Library and its Multidimensions

I AM INDEED delighted to participate in the dedication of digital mobile lab for preservation of heritage manuscripts organized by Mahabharatha Samshodhana Pratisthanam. My greetings to the organizers, all the team members in the digitization and the knowledge business, library and information science professionals.

This digital mobile lab for manuscripts and heritage uses various cutting edge technologies to give a complete end-to-end solution for the holistic process of restoring manuscripts. It integrates the space communications, digital imaging and chemical engineering technologies to achieve the task of documentation, conservation, digitization and dissemination of the manuscripts of our country, wherever they are. Once a custodian institution/repository is identified it would record global positioning data and creates the digital manuscript map of India. The surveyed manuscripts are subject to chemical conservation to defumigate the manuscripts. Subsequently, manuscripts are deciphered and digitized using special scanning station called ‘Vyasa’.

The mobile digital library can become a partner of the Digital Library of India portal. Sharing of digital content with no barriers will truly speak of the technology as an integrator of people. I would like to talk to this audience on “Digital library and its Multi-dimensions”.

Knowledge has always been the prime mover for prosperity. A knowledge society is one of the basic foundations for the development of any nation. Knowledge has many forms and it is available at many places. The acquisition of knowledge has therefore been the thrust area throughout the world and sharing the experience of knowledge is a unique culture of our country. Digital Library is a new instrument which can spread the knowledge nearly at the speed of light. India is

a nation endowed with natural and competitive advantages as also certain distinctive competencies. But these are scattered in isolated pockets and the awareness on these is inadequate. During the last few centuries the world has undergone a change from agriculture society, where natural labour was the critical factor, to industrial society where the management of technology, capital and labour provided the competitive advantage. In the 21st century, a new society is emerging where knowledge is the primary production resource instead of capital and labour. Efficient utilisation of existing knowledge can create comprehensive wealth for the nation in the form of better health, education, infrastructure etc. for improving the quality of life. Ability to create and maintain the knowledge infrastructure, develop knowledge workers and enhance their productivity through creation, growth and use of new knowledge will be the key factors in deciding the prosperity of this Knowledge Society. Whether a nation has emerged as a knowledge society or not is judged by the way the country effectively deals with knowledge creation and knowledge deployment.

The systematic process of finding, selecting, organizing, distilling and presenting information, improves an employee's comprehension in a specific area of interest. Knowledge management helps an organization to gain insight and understanding from its own experience. Specific knowledge management activities help focus the organization on acquiring, storing and utilizing knowledge for problem solving, dynamic learning, strategic planning and decision making. It also prevents intellectual assets from decay, adds to firm intelligence and provides increased flexibility.

Knowledge creation has two dimensions, one is explicit knowledge and the other one is implicit knowledge. The explicit knowledge comes from published books, written materials, proceedings, presentations etc., whereas the implicit knowledge is derived through the systematic observation and capturing of data from the tacit knowledge available among the individuals in the organization, through their approach to problem solving, bottle-neck removal, goals setting, interactions etc. We need a systematic mechanism to capture this knowledge to make the organization a truly learning organization which makes use of existing knowledge judiciously and efficiently.

Digital mobile library is an important component for capturing the explicit knowledge. This has to be supplemented with the implicit knowledge to the digital library system, which will eventually get transformed into a knowledge management system. Let us study how the digital mobile library influences knowledge management in India through research, design and development. This may be relevant to other countries also. I am happy that the Digital Mobile Lab has used the current technology to preserve the manuscripts of rare Indian heritage and also created a digital storage system through a special scanner. Instead of the manuscript being moved to a central place with the associated risk of the manuscript being damaged the mobile lab will reach the place where the manuscript is stored and capture the information in situ. This technique is definitely laudable and will ensure that all the people holding the manuscript will co-operate because they do not have to move to any place for offering the document.

There is a mission of Digital library web portal to create a portal for digital library of India piloted by the Ministry of Information Technology (MIT) with IISc and Carnegie Mellon University as partners for fostering creativity and free access to all human knowledge. This digital library as a first step will create a free-to-read searchable collection of one million books by 2005 in India. This library was launched in 2003. Prof. N. Balakrishnan, Chief Co-ordinator of Digital Library of India informs me that so far 20 centres are operational throughout the country, over 1,50,000 books have been digitized of which nearly 50,000 are in 9 Indian languages. In the library of Rashtrapati Bhavan, which is part of the Digital Library of India, we have so far digitized over ten million pages and also we are digitizing our old official records leading to e-governance implementation. The data will be available for use by different institutions in the country and abroad, depending upon their needs. The programme is progressing in the right direction. I would suggest that Mahabharata Samshodhana Pratisthanam can become a partner of the digital library programme and disseminate the collected information by the digital mobile laboratory among the various enlightened users of the country.

Digital libraries are not the digital equivalents of the present-day library. They would include, besides the books, manuscripts and

journals, information and our heritage in all other forms including speech, folk songs, paintings and carvings. It is important that we take on this mission of integrating all forms of knowledge and culture into our Digital Library.

India has rich information relating to literature, music, traditional system of medicine and science embedded in palm leaves. It is necessary to search, understand and preserve this valuable information. Merely scanning the palm leaves would not be very useful. The number of people who can read the palm leaves and interpret the meanings, identify the plants and stones mentioned in the palm leaves is dwindling. Even those few who can read, cannot write very well, that too may not be fluent in entering into the computer in Digital Forms. The Optical Character Recognition of these ancient scripts is also a very tough problem, almost intractable technically. I suggest that for every palm leaf scanned, we record in audio the information read by the experts. We can then put these on the web and invite other experts to provide free and fair commentary and validate every palm leaf data. This data can also be used for creating a new generation of palm leaves reading experts - a species that has almost vanished.

Digitisation of old manuscripts is a national mission. We should see that all the schools, colleges, and universities digitize their libraries in their own native languages and connect to the outside world within the next four years. We have to ensure availability of fibre optic cables, satellite communication and wireless infrastructure especially in remote areas. It is also essential to realize high bandwidth technology like Multiple 10 Giga Bits connectivity across the country. This will ensure dissemination of information contained in the rare manuscripts to all the remote areas of the country without any distortion.

I dedicate the Digital Mobile Lab for preservation of Heritage manuscripts to the nation and wish the members of Mahabharatha Samshodhana Pratisthanam success in their mission of using technology for preserving and disseminating Indian cultural heritage to all the citizens particularly the researchers.

Energy Conservation : Challenges

I AM HAPPY to participate in the Inauguration of the National Energy Conservation Day. I greet the members of the Ministry of Power, energy experts, academicians, industrialists, municipal authorities, building experts, students and distinguished guests. My greetings to all the award winners of the industry who have conserved energy and actively contributed in this vital national development task, since I consider that energy saved is equivalent to energy generated. I extend my special greetings to the children who have participated in the energy conservation painting competition and are creating a youth movement in this energy conservation mission for bringing out the energy conservation potential. I would like to discuss on the topic “Energy Conservation: Challenges”.

Of about 1,000 billion units of electrical energy produced annually, I understand only 600 billion units reach the consumer, whereas the reported energy shortage is around 100 billion units. It has also been found that the saving potential for the whole country is over 200 billion units. Also, the demand for power at the peak time is around 135,000 megawatts as against the available generating capacity of 123,000 megawatts. This is the result of transmission loss and unaccounted loss. I am sure with appropriate management of power and adoption of comprehensive energy conservation strategy; it is possible to meet the total demand of electrical energy and the peak time power without increasing any generating capacity. To keep pace with the higher economic activities on the three sectors, gradually we have to increase the power generation to 300,000 MW before 2020.

When I think of peak load management of power I am reminded of 1980s when I was working as Director (DRDL). In 1983-84, there

was severe shortage of power in Andhra Pradesh. The Defence labs had a peak load constraint of 3 mega watt power, whereas the connected power was over 10 mega watts. This situation led to inefficient working of all the three labs located in the complex. To overcome the situation the three Directors of the laboratories at Hyderabad devised an innovative plan to stagger the working hours in such a way that one set of laboratories used to work for a four day week (from Monday to Thursday) of 10-1/2 hour duration per day. The other set worked on a different four days (Thursday to Sunday) with one common working day available among all labs to facilitate inter laboratory communication. This system ensured conservation of energy and maintained efficiency within the peak load constraint imposed by the state electricity board. This is one way of practical energy conservation.

Similarly, I would suggest implementation of staggered working hours for the whole country based on the determination of the existing peak demand period in various parts of the country. This will definitely be possible in a large country like ours. For example sun rises at Agartala one hour before it rises in Mumbai. If we follow such a staggered system of working hours in different parts of the country, it will definitely be possible to remove the peak hour shortage of 10 to 12%. In addition, we can also think of staggered working hours and working days in various industries within a metropolitan city for enabling reduced congestion on the roads leading to smooth flow of traffic on all the days. Ministry of Power may like to analyze the problem and suggest a staggered working hour model for the whole country for ensuring full availability of peak load demand of all industries. Now I would like to discuss some measures which can be taken for meeting the overall energy shortage of the nation.

As a part of national campaign on Energy Conservation 2005 the Ministry has organized a school level painting competition amongst 3.5 lakh students of fourth and fifth class belonging to over 17,500 schools spread in different parts of the country. I appreciate the action taken by the Ministry of Power in inspiring the children. In addition to this, I would suggest another scheme which can be introduced amongst students for detecting and reporting areas through which energy can be conserved.

In my many interactions with school children, parents, teachers and educationists, I have been told that our existing educational process tends to emphasize learning by memory rather than strengthening creativity. The essence of Science & Technology on the other hand is embedded in two of the most fundamental impulses – the desire to discover and the desire to invent. It is vital that our education process nurtures and nourishes these two impulses.

An attempt in this direction has been made in a pilot programme called “Mapping the Neighbourhood” initiated by the Department of Science and Technology. In Almora district in Uttaranchal children from 20 schools have been motivated to use mapping techniques to investigate and map basic socio-economic, environmental and ecological issues being faced by the neighbourhood community. Armed with the scientific and technological tools such as Global Positioning System (GPS), Geographic Information System (GIS), Space Imagery incorporated in the hand held computers; the children are creating maps with the neighborhood details to improve their understanding of the immediate environment. These maps will enable further the technological community to find solutions for the regeneration of fast disappearing natural sources of water, improving road connectivity, finding better locations for electricity and water distribution points, reducing traffic congestion and improved systems of garbage collection.

Another children programme can be launched through a creative task. The children can be asked to map the energy consumption of each of the household, industry, hospital and the hotels in a particular area. They can also request their own parents and the other members in the locality to save electricity in their buildings to the extent possible by switching off the lights, fans, air-conditioners, and other electronic gadgets when they are not needed continuously. This measure will not only save electricity but also prevent accidents occurring due to electrical short circuits. If this awareness for saving electricity comes to our youth, I am sure we will easily be able to save more than 10% of the energy consumption. This will also give our youth an opportunity for participating in our national development mission about which they have been constantly asking during my various interactions.

One of our experts says that “For a normally constructed building, the present energy consumption in India is 300 kwh per sq m annually which can be brought down to 140 kwh per m sq annually by proper designs/details/philosophy, whereas in Germany with its strict energy codes it is reported that the consumption is only 50 kwh per sq m annually. It is all the more important for India to achieve at least a target of 100 kWh per sq m annually within the next 5 years. This will need co-ordinated effort between architects, builders and the energy engineers, a newly developed expertise.

The architects and building planners have to play a very important role in the design of the building with these features. The seeds of this perspective have to be sown in the schools of architecture and town planning. Energy conservation should start right from the location of the site, the direction of buildings, windows, doors, glare etc.—the aim should be to use maximum advantage of the sun and wind, while minimizing the wasteful heat load from the sun into the buildings and roofs.

The construction sector plays a significant role in economic development of the country. Activities in the construction sector are complex, highly dispersed and resource demanding. The activities of the sector result in the loss of important natural assets and impose severe stress on the environment. Agricultural land is often lost through urbanization and extraction of raw materials. The consumption of fossil fuels contributes to increased air pollution and emissions of greenhouse gases. Energy is required for manufacturing materials, for transport and for construction of buildings. Apart from this initial energy use, there is also need for energy for functioning of buildings. In the developed countries there is a growing demand for an environmental impact assessment of all building projects, which includes considerations of embodied energy, i.e. the energy that is consumed in extraction of raw materials and production of finished building materials.

However, construction is crucial to the prosperity and civilization of human beings. People require habitats, schools, work places, markets, places for sports and cultural activities. Our task therefore is to have

more and better construction for our billion people, but minimize per capita energy consumption in the whole chain by value addition in construction and maintenance. There is a need to reduce the embodied energy especially in respect of office buildings, hospitals and hotels by at least 10% of the present embodied energy consumed which is in the region of 5,000 kilo watt hour per square metre.

I am happy that a good beginning has been made due to the enactment of the Energy Conservation Act 2001. Bureau of Energy Efficiency has been formed which has initiated the task of developing Energy Conservation Building Codes.

The energy conservation in the shop floor has to start right from the operator. We have to clearly create awareness and a sense of responsibility among all operators to conserve energy in their own limited areas. One method of planned improvement can come by having a constant review of the energy utilization and reasons for variance. The variance analysis will lead to determination of the causes of increase which in turn can be attended to by the maintenance personnel. Also, there is a need to instal energy conservation control system which will be initiated whenever the machinery is idle and is not required to be kept on.

In continuous operation chemical plants, switching off and on may lead to inefficient process leading to enhanced energy utilization. Wherever continuous reliable energy is not available, it will be economical to use back-up system to ensure process efficiency and prevent infructuous energy expenditure due to unplanned start – stop operation. The companies may institute appropriate incentives for encouraging the employees to conserve energy in their own domain activity since this will have a direct bearing on the profitability of the company.

Energy is a vital input for industry. Enterprise-wise energy conservation is an important wealth generator for every industry. For ensuring competitiveness per capita energy utilization is an important index. Keeping this in mind, I would request the experts assembled here to address the following issues relating to practical energy conservation implementation strategies:

- (a) Evolving energy utilization norms for different industries such as cement, aluminum, steel, urea, textile etc. on per capita basis and provide a challenge to designers to work towards the target.
- (b) Creating an enterprise-wise review mechanism to reveal the variance from planned utilization to the actual. As far as possible try to allocate the responsibility for this variance and take immediate corrective action.
- (c) Creating an idea bank in which employees can provide innovative solutions for energy efficient operations. There must be a system of analysis of ideas for implementing practical ideas on the shop floor and suitable rewards.
- (d) It is essential to instal progressively, the energy efficient nano lamps, energy efficient heating and AC system in the enterprise. For example, nearly 75 million households in the rural sector today do not have electrical connection. It would be a great saver of electricity if we can instal nano crystal based LED lamps in all these rural houses.
- (e) A mission mode programme can be created for energy conservation. We have to set a target of saving 25 billion units per year from the present 3.2 billion units, so that we can wipe out the existing shortage within the next four years.
- (f) Preparation and circulation of a small booklet enumerating the simple to follow good practices for energy conservation by offices, residential complexes, industries and agricultural farmers.
- (g) In house R&D establishment should constantly work towards energy efficient processes for adoption in both residential and commercial buildings.

I once again congratulate all the award winners and my best wishes to the Ministry of Power and its partners for success in their mission of providing uninterrupted hassle free power to all the citizens and the industry with zero system wastage.

6

Mass Media

Media to know the Aspirations of the Youth

I AM DELIGHTED to participate in the Award Ceremony for Recognizing Excellence in Journalism 2004 organized by the International Press Institute (IPI), India Chapter. My congratulations to award winner the NDTV and greetings to noted editors, publishers, academicians, columnists, writers, media specialists and distinguished guests. I would like to share with you my thoughts on the topic “Can media be the partner in National Development”. Media has to know the dreams and aspirations of our people, particularly the youth of the nation.

Developed India is a nation where the rural and urban divide has been reduced to a thin line. A nation where there is an equitable distribution of energy and quality water. A nation where agriculture, industry and service sector work together in symphony, absorbing technology thereby resulting in sustained wealth generation leading to higher employment potential. A nation where education is not denied to any meritorious candidates because of societal or economic condition. A nation which is the best destination for the most talented scholars and scientists from all over the world. A nation where the best of health care is available to all the billion population and the communicable diseases like AIDS/TB, water and vector borne diseases, cardiac diseases and cancer are extinct. A nation where the governance uses the best of the technologies to be responsive, transparent, easily accessible and simple in rules, thereby corruption free. A nation where poverty has been totally eliminated, where illiteracy and crime against women are eradicated and where the society is unalienated. A nation that is prosperous, healthy, secure, peaceful and happy. A nation that is one of the best places to live in on the earth and brings smiles on a billion plus faces.

In the Indian history, very rarely we have come across a situation, all at a time, an ascending economic trajectory, continuously rising foreign exchange reserve, global recognition of technological competence, energy of 540 million youth, umbilical connectivities of 20 million people of Indian origin in various parts of the planet, and the interest shown by many developed countries to invest in our engineers and scientists including setting up of new R&D centres. The priorities of the Government emphasize on economic development by ensuring growth rate of 7% to 8% annually, enhancing the welfare of the farmers and workers and unleashing the creativity of the entrepreneurs, business persons, scientists, engineers and other productive forces of the society. Also a dynamic technology powered dynamic media is in place.

This is the time the nation has to focus all its technological and financial growth towards the Vision, Vision of transforming India into a developed nation before 2020. Media can definitely become a great partner for promoting this Vision, as it played its role during the independence movement 1857-1947.

Hence, I thought of highlighting two vision components - one is India 2020 Mission and the other is PURA (Providing Urban Amenities in Rural Area) programme.

Our nation is going through a major challenge of uplifting of 260 million people who are below the poverty line and also to give better life for many millions who are on the border line of poverty or just above the poverty line. They need decent habitat, they need work with reasonable income, they need food, they need health care, and they need education and finally resulting in a good life. Our GDP is growing at more than 6% per annum on an average, whereas the economists suggest that to uplift the people from below the poverty line, our economy has to grow at the rate of 10% per annum consistently, for over a decade.

Integrated action: To meet the need of one billion people, we have the mission of transforming India into a developed nation. We have identified five areas where India has a core competence for

integrated action: (1) Agriculture and food processing, (2) Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country, (3) Education and Health care, (4) Information and Communication Technology, and (5) Strategic sectors. These five areas are closely inter-related and if well done would lead to food, economic and national security. Another important mission linked to national development is PURA.

Nearly 700 million people of India live in the rural areas in 600,000 villages. Connectivity of village complexes providing economic opportunities to all segments of people is an urgent need to bridge the rural-urban divide, generate employment and enhance rural prosperity. The essential needs of the villages today are water, power, road, sanitation, and health care, education and employment generation.

Essential Connectivities through PURA: The integrated methods, which will bring prosperity to rural India are: the physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through internet kiosks; knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes; these three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing the products.

As you may be knowing a number of development ventures are taking place in different parts of the country. Some of them are Periyar PURA in Thanjavur district of Tamil Nadu, BAIF - (Bharatiya Agro Industries Foundation) in Gujarat, Project Siruthuli in Coimbatore, Seed Cotton Productivity in the Village Nava Pind of Punjab, Synergy Mission for Environmental Upgradation in Punjab and the Electricity Generation through Municipal Waste in Hyderabad and Vijayawada of Andhra Pradesh. I will discuss the details of these projects and the results achieved so far, since the media need to know the silent changes that are taking place.

Recently I had visited Periyar Maniammai college of technology for women and inaugurated a PURA Complex. I thought of sharing

with you the developmental concept of a cluster of over 60 villages near Vallam, Thanjavur district of Tamil Nadu which involves a population of 3 lakhs. This PURA complex has all the three connectivities - physical, electronic and knowledge—leading to economic connectivity. The centre of activity emanates from the women engineering college that provides the electronic and knowledge connectivity. Periyar PURA has health care centres, primary to post-graduate level education and vocational training centres. This has resulted in large scale employment generation and creation of a number of entrepreneurs with the active support of 850 self-help groups. Two hundred acres of waste land has been developed into a cultivable land with innovative water management schemes such as contour ponds and water sheds for storing and irrigating the fields. All the villagers are busy in either cultivation, planting *Jatropha*, herbal and medicinal plants, power generation using bio-mass, food processing and above all running marketing centres. This model has emanated independent of any government initiative. The committed leadership has been provided by the Engineering institution. This gives me the confidence that PURA is a realizable proposition and this movement can be multiplied by thousands by entrepreneurs, educational administrators and philanthropic institutions with the support of the government agencies.

Similarly, I have visited other tribal villages in south Gujarat and there another model of PURA has succeeded through the BAIF and Gujarat Government combination.

Food security and self-employment with good income is crucial in tribal and semi-arid regions. I would like to share with you an integrated village cluster development model. In these regions every summer the tribal people migrate to nearby towns. BAIF - (Bharatiya Agro Industries Foundation) has introduced a model in two villages with peoples' co-operation and the participation of state authorities. Firstly water harvesting was undertaken to get water for every individual. Every home was provided with livestock and also a market for milk. Simultaneously, fruit orchards were established with various fruit crops such as cashew and mangoes, which are tolerant to drought. When I visited these villages, there was a connecting road and water ponds.

The tribal population, with radiant smiles on their faces, was harvesting crops, packaging and carrying milk to different supply points. I happened to see the economic growth and prosperity of the tribal people, which has been facilitated by BAIF with people's participation. I understand that this model Vadi (Orchard) has now been replicated in many places by the state governments in the Deccan and desert regions. If such actions are multiplied in a reasonably synchronized manner, then locally generated wealth will increase and create new economic opportunities, thus creating greater income and prosperity levels. Now I would like to discuss about the project Siruthuli aimed at large scale rainwater harvesting, afforestation, sewage/waste water treatment and solid waste management at Coimbatore.

This is an initiative started by Coimbatoreans for Coimbatoreans. This ecological project aims to bring back the glory of Coimbatore and its rich heritage. The project is represented by people from all walks of life and professionally organized. The primary focus is on large scale rain water harvesting, afforestation, sewage/waste water treatment and solid waste management. They have already standardized five of the nine primary tanks in Coimbatore for large scale rainwater harvesting. Over 600 saplings have been planted on the bunds of the desilted tanks and are being maintained. They are moving towards a target of planting 15 lakh trees by the end of 2005. The comprehensive study has indicated outlet of the city sewage as 10 million litres per day. A pilot plant is being taken up for sewage treatment to treat one million litres per day. The treated water will be sold to the agriculturists and industrialists as a revenue earning measure. The garbage and debris to the extent of over 26,000 cubic metres in one of the city's largest tanks have been removed. These are the major achievements for developing a growing city. The next project I would like to talk to you is on improving the productivity of wheat and cotton through a co-operative movement in Bihar and Punjab where farmers, agricultural scientists and industrialists are partners.

Wheat Productivity: There have been successful experiments carried out by TIFAC team in Bihar, where per hectare output of wheat has been tripled by farmers in collaboration with agricultural scientists through scientific methods. As a result, the earnings of the

participating farmers have remarkably improved. Such experiments can be replicated in many parts of our country, carefully tailored to local conditions. This is a crucial socio-economic need.

Seed Cotton productivity: Textile industry is very important for the Indian economy. The basic raw material is cotton. India is the third largest producer of cotton in the world. However, compared to the world average of 700 kgs of seed cotton per acre we produce only 350 kgs of seed cotton per acre. It is indeed a technological concern for the nation. Shri Oswal of Vardhman group adopted the village Nava Pind in the northern region, brought out a co-operative movement of the farmers, scientists, trainers and the industry and launched cultivating cotton in over 1200 acres. A training programme was launched for farmers starting with soil characterization, matching the cottonseed to soil, water and fertilizer management. They were also trained on proper application of fertilizer and pesticide during the seeding and growth process in the right season and proper irrigation techniques to enhance the productivity of cotton.

The project resulted in increasing the average seed cotton yield of the village from 450 kg per acre during the year 2002-2003 to 950 kg per acre for the year 2003-2004, that too with a considerably reduced investment. This led to the increase in net return per acre in the village from Rs. 2400 per acre to Rs. 17,000 per acre (a seven times increase in return). This model can be replicated in many cotton growing regions in the country and India can definitely produce 25% of the total world production compared to the existing 12%. This single village model has already been replicated in ten villages with very good results towards improving the productivity of cotton uniformly in all the villages. If this model is implemented in the entire cotton belt, it has the potential to generate wealth of over Rs. 25,000 crores a year for the nation and also generate employment opportunities for millions of youths. In the next example I am narrating the experience of a societal mission of improving the environment through the cleaning up of Kali Bein rivulet in Punjab.

The status of environmental cleanliness is one of the indicators of development of a nation. As a nation, we have to keep our environment

clean and tidy including all our places of worship and rivers. I am delighted to learn the Kali Bein rivulet, the place where Gurunanak Dev is said to have received enlightenment and which had over the centuries turned literally into a sewage-ridden, weed choked drain, is today flowing clean and proud due mainly to the efforts of Baba Balbir Singh Seechewal in partnership with the Punjab State Government. From the discussions I understand that he organized people's participation in stopping the massive flow of sewage into the Bein and cleaned the 160 km long polluted and choked rivulet within the last three and a half years by deploying on an average 3000 volunteer workers per day. Today one can feel the flow of fresh water in this rivulet released from the Tarkina Barrage by the government about a year ago. The revival of the rivulet has recharged the water table as the hand pumps that had become dry for the past four decades are now pumping out water. Baba not only did the cleaning up operation by clearing Bein from the weeds and hyacinth, but also built bathing ghats at five places. He also built more than 100 km long kutchra road on the banks of the rivulet.

While I was thinking how we should solve the problem of improving the environment of rivers and religious places, I find one of our enlightened citizens has taken the initiative and demonstrated the power of ignited individuals to solve the societal problem. Let this model spread in all the places of divine worship and inspire the pilgrims to participate in the divine task of clean environment in water and air. "Thousands of such local initiatives are needed for making our country green." Finally I would like to talk about producing electricity through municipal waste which has threefold advantages. The scheme improves the environment, releases hectares of land occupied in dumping municipal waste and augments electric power to the grid.

Increased urbanization has led to a serious problem of accumulation of municipal solid waste. Efficient and environmentally clean disposal of garbage has always been a major technological challenge. While being a threat to the environment, mounting garbage is also a rich source of energy. The potential for converting this waste into useable energy, which will eliminate a major source of urban pollution, was

realized by one of our innovative organizations, Technology Information Forecasting and Assessment Council of DST which helped in developing a completely indigenous solution for the processing of waste into a source of fuel. This fuel could, in turn, be used for generation of electricity through mini plants. Two entrepreneurs in Andhra Pradesh adopted the technology with refinement and established two independent plants in Hyderabad and Vijayawada generating over 12 megawatts of electricity which is being supplied to the State grid. India needs thousands of mini power plants using municipal waste. Industrial sector can provide the thrust for promoting creation of such power plants in major municipalities as a first step in collaboration with banks and non-governmental organizations.

These are some of the examples of rural development projects which can be promoted by the industry with the active participation of banks for upliftment of the 700 million people living in our villages. There are similar possibilities in water, habitat, infrastructure, ICT, agriculture and many more. Once the industries get committed in all these sectors in a proactive manner, I am sure the path to development will be much smoother and our realization of development will be much faster.

I have some interesting responses to my reaching out to the people through the media. I would like to share a few of them with you all here today. The oath administered to the children on 2004 Republic Day eve broadcast has resulted in motivating the Kutch Ecology Foundation, who have made the entire Kutch district green within the last 10 months. I hear similar efforts taking place in southern part of India as well.

Two students of Velammal Engineering College, Lakshmanan and Gayathri, have written to me how they succeeded in developing a new paradigm of CD reading using nano antennas instead of conventional laser reading systems after hearing my talk on nano sciences and technology. They have presented their paper in IEEE Nano 2004.

Likewise my talk on stem cell for treating visual defects resulted in a lot of queries from various quarters which I directed to Dr. Taraprasad Das of L.V. Prasad Eye Institute for advice and treatment. This is the

power of the media and it demonstrates how it can bring about positive change for betterment of society.

Our media is one of the oldest, unconstrained and possibly the most responsible in playing an active role in being the conscience keepers of the nation. The heritage and the history of News Media has many lessons not only for the students and practitioners of Journalism but also for every one of us. Somehow, the preservation of our past newspapers and their archiving have not been in tune with technological advances – particularly those in scanning, OCR, storage and retrieval. The Digital Library across the country and elsewhere in the world had been focusing on digital preservation of our cultural heritage, manuscripts and books. Time has come for the journalists and media barons to create a Digital Library that has all the newspapers, magazines and radio and TV programmes ever produced by this country in all languages since the beginning. Today this is possible and affordable and India can show the way to the rest of the world by making an inter-operable open archive. The next generation would be ever grateful to you and will remember you, if you do this.

Now we are in the mission of transforming India into a developed country by the year 2020. This mission needs the participation and contribution from every citizen.

The vehicle for carrying forward this mission should be the Indian media in all its forms, viz. print, radio, television and internet in multiple languages. We all know that the media is today concentrating on 300 million people who are living in the urban areas. But I visualize that media should become media for one billion people. It must reflect the thoughts and aspirations, trials and tribulations, problems and solutions of the 70% of population who are living in the villages. My suggestion for the media would be that they should capture the development activities taking place in different parts of the country especially in the rural areas and disseminate through various channels which will enable the common man to appreciate and understand the benefits of certain projects for the region. Media has to spread achievements of good and successful individuals and teams. I would suggest that articles on scientific achievements written by reputed

science writers be published in two pages at least once in a week. If it is continuously done they will be able to emulate and apply the techniques in their region. I am looking for such intense partnership from the media in this mission.

The young journalists should be the visionaries for inspiring our people to contribute towards national development. The media space and time must be fully utilized to bring out the best to the viewers and readers which can enable them to take the right decision in selecting the development route pertaining to their area and region.

In the present development context of the nation I would like the media to take up the following missions for immediate implementation.

1. A Media movement: Developed India by 2020.
2. Media becoming a development partner in the programme of PURA (Providing Urban amenities in Rural Area) – connectivity is the focus.
3. Celebrating every aspect of the success of the nation, from any part of the country.
4. Evolution of corruption-free India before 2010. Particularly, I have started a movement of administering an Oath among the youth which states, “I will lead an honest life free from all corruption and will set an example for others to adopt a transparent way of life.”
5. Promoting an enlightened society, which means education with value system, transforming religion into a spiritual force and building economic prosperity of every nation based on its core competence. For this mission, a unique world body is essential.
6. Media should bring honour to the womanhood.
7. Scanning and digitizing all old issues of the print media since its establishment and store in a digital library to preserve our national heritage and make it available for research.

A nation without a vision is just like a ship in the ocean without an engine for powering and sails (rudder) for direction. Fortunately,

India's youth power is the engine that gives the thrust to the movement towards growth. The media can certainly give a positive direction for development by becoming the multiple sails of the ship.

The International Press Institute with its media members may motivate every newspaper and electronic channel in our vast country to transform our nation into the profile of Developed India as discussed. This is the mission which has to be done unitedly by the entire media organisation. They have to use the special communication skill unique to each region and language. My congratulations to NDTV for receiving the IPI-India Award for Excellence in Journalism and my best wishes to all the participants for successful partnership in the developed India mission.

Nobility in Politics

I AM INDEED delighted to participate in this National Film Awards function. I congratulate particularly all the award winners, artists, technicians and all those associated with films, for their excellent performance in various facets of entertainment industry. I particularly congratulate Shri Mrinal Sen for winning the coveted Dada Saheb Phalke Award for the year 2004.

When I see you all, the galaxies in every field of cinema and theatre, if you don't mind, I would like to give a challenging mission. What is that mission? The mission I have for you is, through your cinema, through your songs, through your actions, can you make the nation to win? The nation has got everything, but we need leaders with nobility, can you present the success stories of young men and young women in the political field winning in your story, in your song and in your action to make the nation great? You may say that you find it difficult in reality, but it is not true. Mahatma Gandhi was there, Jawaharlal Nehru was there, Vallabbhai Patel was there, Gopalakrishna Gokhale was there, Abul Kalam Azad was there, like this a number of leaders were there. If you can portray ten episodes of present-day young men or women winning and succeeding in politics with nobility, you have done your mission.

In this connection, now I would like to recite a poem which I composed some time back. It is titled "Rock Walls".

Rock Walls

Some build rock walls all their lives,
When they die miles of walls divide them.
Others build rock walls, one rock on another,
And: then build a terrace, where they pray for love.

Yet others build walls to enclose orchards,
Endeavouring to find ways to fulfil hunger.
A few others build rock walls - to make a home,
It is their mission to serve humanity and nature.

I build no walls, to confirm to joy or sorrow;
To sacrifice or achieve, or to gain or lose,
I just grow flowers on all open spaces,
And float lilies on ponds and rivers.

I keep planting trees, for birds to have nests,
At the dawn of the sun, when morning breeze blow.
Sunlight gets filtered through shining tree leaves,
Birds' flight gives me sense of freedom and pleasure.

Scattered light of colour and treasure,
Fragrance of flowers gives me delight of creator.
Lilies floating over like nature's dance,
Why should I build walls to confine them all?

I have no house, only open spaces,
Filled with truth, kindness and dreams.
Desire to see my country developed and great,
Dreams to see everywhere happiness and peace.

Will you all work for converting this desire and dream into action?
My best wishes to all of you for success in this challenging mission.

Press – a Partner in National Development

I AM DELIGHTED to participate in the concluding function of the Diamond Jubilee Celebrations of Press Club, Kolkata. Kolkata has the distinction of being home to the first modern press in India and the first press club in the subcontinent. Raja Ram Mohan Roy brilliantly propagated the importance of the freedom of the press as early as in 1823. Kolkata Press Club has a rich history and tradition. Contribution of the Kolkata Press Club during the freedom movement is noteworthy. I extend my greetings to all the members of the Press Club of Kolkata during this Diamond Jubilee Celebrations. On this occasion I would like to discuss with you the topic “Press – a partner in national development”.

In the Indian history West Bengal has played a very important role particularly in the freedom movement. The freedom movement is a multi-dimensional activity emanating from the power of the leader through his/her writings, speeches, some time in the form of freedom songs and essays, and analyses. The poets composed patriotic songs and the media particularly the print media gave the momentum to the growth of the freedom movement in spite of the restrictions placed by the rulers. Mahatma Gandhi, Netaji Subhash Chandra Bose, Sri Aurobindo, and many others led the freedom movement. Similarly, in the pre-independent era, eminent scientists and Nobel Laureates have made many important contributions to the science, medical field, literature, poetry and social reforms. The great names which come to my mind are S.N. Bose, J.C. Bose, Rabindra Nath Tagore, Mahalanobis, Meghnad Saha, Sir C.V. Raman, Dr. B.C. Roy and Mother Teresa. West Bengal is also famous for many industries. In such an environment of the past, which is continuing in the present and also will continue in the future, Press Club of Kolkata will indeed have a tremendous

opportunity for presentation of news, analyses and highlights. In future publication of researched editorial, researched news analysis and researched events should become the central theme of the media.

In the Indian history, very rarely we have come across a situation, all at a time, an ascending economic trajectory, continuously rising foreign exchange reserve, continuously reducing rate of inflation, global recognition of technological competence, energy of 540 million youth, umbilical connectivities of 20 million people of Indian origin in various parts of the planet, and the interest shown by many developed countries to invest in our engineers and scientists including setting up of new R&D centres. As per the report titled “From the Ganges to the Thames” which states that the Indian Foreign Direct Investment in Britain is second only to that of the US, Indian FDI projects in Europe have increased from just five to 119 during the period 1997 to 2004. The Government is also committed to economic development by ensuring a growth rate of 7% to 8% annually, enhancing the welfare of the farmers and workers and unleashing the creativity of the entrepreneurs, business persons, scientists, engineers and others—productive forces of the society. Our nation has built a reputation for its democracy and for providing leadership for the one billion people with multi-culture, multi-language and multi-religion. And also our technological competence and value system with civilizational heritage has been highly respected. Can we expect anything better than this for increasing the momentum of our development missions? Let us translate this great opportunity for transforming our states into developed states to realize our cherished dream of Developed India before 2020.

With 700 million people living in 600,000 villages the events and news have to be unique and large when compared to other countries. Hence our print media has got a great challenge. Our news reporting is mainly urban based in many of our States. This situation needs change. I consider the newspapers or media are indeed a partner in our national development. A partner means “somewhere an innovative use of organic cultivation is taking place and the productivity of wheat or rice is increased by two times”, this indeed is a very important news. This news must be studied, analyzed and propagated to many

places in the country. Similarly, a water pond had remained unused for years and the farmers have collectively worked together and made it operational, this indeed is a big news and must be reported. Such reporting will enable desilting and rejuvenation of lakhs of water bodies which are non-operational today in many of the States. Similarly, a constructive criticism of how the Panchayat is working, how the flow of funds from the Government is reaching the required development project must also be reported so that necessary corrective measures can emanate. Now I would like to discuss some of the innovative development programmes that need media attention, which I have come across in different parts of the country.

This is an initiative started by Coimbatoreans for Coimbatoreans. This ecological project aims to bring back the glory of Coimbatore and its rich heritage. The project is represented by people from all walks of life and is professionally organized. The primary focus is on large scale rainwater harvesting, afforestation, sewage/waste water treatment and solid waste management. They have already standardized five of the nine primary tanks in Coimbatore for large scale rainwater harvesting. Over 600 saplings have been planted on the bunds of the desilted tanks and are being maintained. They are moving towards a target of planting 15 lakh trees by the end of 2005. The comprehensive study has indicated outlet of the city sewage as 10 million litres per day. A pilot plant is being taken up for sewage treatment to treat one million litres per day. The treated water will be sold to the agriculturists and industrialists as a revenue earning measure. The garbage and debris to the extent of over 26,000 cubic metres in one of the city's largest tanks have been removed.

The status of environmental cleanliness is one of the indicators of development of a nation. As a nation, we have to keep our environment clean and tidy including all our places of worship and rivers. I am delighted to learn about the Kali Bein rivulet, the place where Gurunanak Devji is said to have received enlightenment. Over the years this rivulet has turned into a weed choked drain. Recently the river is clean due to the efforts of Baba Balbir Singh Seechewal in partnership with the Punjab State Government. From the discussions, I understand that he organized people's participation in stopping the massive flow of

sewage into the Bein and cleaned 160 km long polluted and choked rivulet within the last five years by deploying on an average 3000 volunteer pilgrims per day. Today one can feel the flow of fresh water in this rivulet released from the Tarkina Barrage by the government about two years ago. The revival of the rivulet has recharged the water table as the hand pumps that had become dry for the past four decades are now pumping out water. These are the major achievements of voluntary organisations required to be celebrated by the Press. This resulted in generation of an Oath to be taken by pilgrims visiting the places of worship.

During the last two years I happened to see the products and processes innovated by grass-roots innovators while giving away the awards on behalf of National Innovation Foundation. There are many creative products made by the rural artisans and farmers which have enormous amount of societal value. Some of the award winning items have been highlighted in certain magazines recently. Media should work towards stories that generate confidence about the creative potential at the grass roots. I would suggest that such reporting must become a common practice by the media in multiple languages. This will not only motivate the innovators but also enable many progressive farmers to make use of the products and processes in real life leading to improved productivity and wealth generation.

Recently I had visited Periyar Maniammai College of Technology for Women and inaugurated a PURA Complex. I thought of sharing with you the developmental concept of a cluster of over 60 villages near Vallam, Thanjavur district of Tamil Nadu which involves a population of three lakhs. This PURA complex has all the three connectivities—physical, electronic and knowledge—leading to economic connectivity. The centre of activity emanates from the women engineering college that provides the electronic and knowledge connectivity. Periyar PURA has health care centres, primary to post graduate level education and vocational training centres. This has resulted in large scale employment generation and creation of a number of entrepreneurs with the active support of 850 self-help groups. 200 acres of waste land has been developed into a cultivable land with innovative water management schemes such as contour ponds and

water sheds for storing and irrigating the fields. All the villagers are busy in either cultivation, planting *Jatropha*, herbal and medicinal plants, power generation using bio-mass, food processing and above all running marketing centres. This model has emanated independent of any government initiative. The committed leadership has been provided by the Engineering institution. This gives me the confidence that PURA is a realizable proposition and this movement can be multiplied by thousands by entrepreneurs, educational administrators and philanthropic institutions with the support of the government agencies. Press can definitely celebrate such schemes which enable many entrepreneurs to join the movement.

There have been successful experiments carried out by TIFAC team in Bihar, where per hectare output of wheat has been tripled by farmers in collaboration with agricultural scientists through scientific methods. As a result, the earnings of the participating farmers have remarkably improved. Such experiments can be replicated in many parts of our country, carefully tailored to local conditions. This is a crucial socio-economic need.

Textile industry is very important for the Indian economy. The basic raw material is cotton. India is the third largest producer of cotton in the world. However, compared to the world average of 700 kgs of seed cotton per acre we produce only 350 kgs of seed cotton per acre. It is indeed a technological concern for the nation. Shri Oswal of Vardhman group, adopted the village Nava Pind in the northern region, brought out a co-operative movement of the farmers, scientists, trainers and the industry and launched cultivating cotton in over 1200 acres. A training programme was launched for farmers starting with soil characterization, matching the cottonseed to soil, water and fertilizer management. They were also trained on proper application of fertilizer and pesticide during the seeding and growth process in the right season and proper irrigation techniques to enhance the productivity of cotton.

The project resulted in increasing the average seed cotton yield of the village from 450 kg per acre during the year 2002-2003 to 950 kg per acre for the year 2003-2004, that too with a considerably reduced investment. This led to the increase in net return per acre in the village

from Rs. 2400 per acre to Rs. 17,000 per acre (a seven times increase in return). This model can be replicated in many cotton growing regions in the country and India can definitely produce 25% of the total world production compared to the existing 12%. This single village model has already been replicated in ten villages with very good results towards improving the productivity of cotton uniformly in all the villages. If this model is implemented in the entire cotton belt, it has the potential to generate wealth of over Rs. 25,000 crore a year for the nation and also generate employment opportunities for millions of youths.

I have given a few examples of notable scientific technological and societal accomplishments. There may be many more successes of this nature. The members of the Press must be sensitive to such accomplishments and celebrate them with full vigour. This will definitely motivate many institutions to emulate the innovative developments in their own regions.

I have a suggestion particularly to the members of press consisting of editors, journalists, correspondents and reporters. In our country it is essential to have research wings in the academic institutions developing media personnel in reporting news, event analysis and highlights. The owners of newspapers should encourage research being carried out by experienced and young reporters for acquiring post-graduate qualifications which will improve the quality of content of the print media. For example, before any issue is discussed in foreign newspapers, they send it to an internal research group where data is studied, verified and factual news is generated and sent for publication. When there was a critical comment about outsourcing to India, a US journalist stayed in India and studied the issue and found out that the companies engaged in Business Process Outsourcing (BPOs) were carrying out business using imported equipment from UK and USA. Thus, they found that the BPO industries provided an indirect market for the hardware industries of US. Immediately this was reported in the Indian media in a big way. Similarly a Discovery Channel media person wanted to study India's growth in Information Technology, Thomas Friedman came to India and stayed for a month and visited Bangalore and other places. Based on his news analysis he wrote a book titled "World is Flat". This book has become famous not only

in India but throughout the world. Such is the power of research. I would suggest our Indian newspaper agencies should encourage research being carried out by our correspondents and journalists within India in academic research institutions, which will definitely improve the quality of our reporting.

On conducting a quick search on the internet, I could not find an exclusive website of the Kolkata Press Club. In case you do not have a separate website, it is very necessary that you should set up one to ensure that all the members are updated with the latest happenings in the Press Club as well as world-wide. It will also provide you with a quick and cheap mode of information exchange. No one is better aware than the Press about the advantages of information and communication technology and I am sure the Press Club is already working on this if they have not already done so.

I find that the Press Club is also very alive to the current problems being faced by the country and have been organizing events on burning social, political and national problems thus providing a forum for exchange of ideas and opinions on these issues. I was very happy to note that the Press club has highlighted the problem of HIV/AIDS by organizing a joint workshop with the AIDS Prevention Society. As you are aware, Kolkata is high on the HIV risk list and therefore, all such efforts need to be encouraged and highlighted.

In the present development context of the nation, I would like the Press to take up the following missions for immediate implementation.

1. A Press movement: Developed West Bengal before 2020.
2. Press becoming a development partner in the programme of PURA (Providing Urban amenities in Rural Area) – connectivity is the focus.
3. Celebrating every aspect of the success of the State and the Nation particularly in rural areas.
4. Evolutions of corruption-free India before 2010. Particularly, I have started a movement of administering an Oath among the youth which states, “I will lead an honest life free from

all corruption and will set an example for others to adopt a transparent way of life.”

5. Promoting an enlightened society, which means education with value system, transforming religion into a spiritual force and building economic prosperity of the nation based on its core competence. For this mission, a unique world body is essential.
6. Press should bring honour to the womanhood.
7. Scanning and digitizing all old issues of the print media since its establishment and store in a digital library to preserve our national heritage and make it available for research.

A nation without a vision is just like a ship in the ocean without an engine for powering and sails (rudder) for direction. Fortunately, India's youth power is the engine that gives the thrust to the movement towards growth. The Press can certainly give a positive direction for development by becoming the multiple sails of the ship.

The Members of Press Club of Kolkata may undertake the task of motivating every citizen in Bengal and other parts of the nation to work towards transforming India into a developed nation well before 2020. This is the mission which has to be done unitedly by the entire press organisation. They have to use the special communication skill unique to each region and language. Once again let me greet you all on the occasion of the Diamond Jubilee Celebrations of Kolkata Press Club and wish you success in your mission of igniting the minds of our youth for making positive contribution towards the development of our nation.

Electronic Connectivity of a Billion People

I AM DELIGHTED to address the General Assembly of International Union of Radio Science (URSI). My greetings to the organizers and all the members participating in the General Assembly. Today I would like to talk to you on the topic “Electronic Connectivity of a Billion People.”

The total land area of India is around 3.3 million square kilometre with 7000 kilometre of coast line. The altitude of the country varies from the sea level to 8,600 metre. The entire area is spread into deserts, hilltops, mountain tops, sea shores, islands, valleys and plains. Out of the billion plus population in the country 70% live in 600,000 villages. India is poised to become a knowledge society. Electronic and knowledge connectivity is the key to realize this goal. Connecting one billion people throws up multiple challenges. Now I would like to discuss the relationship between societal transformation and electronic connectivity. It also means the connectivities for a sixth of our planet’s population. Perhaps these thoughts may serve as a model for your Union, if needed.

The core of this model for electronic connectivity for prosperity of one billion people is the partnership between governmental and multiple institutions in the public and private domains. The strength of this partnership for collaborative growth and economic prosperity is facilitated by free flow of knowledge and information in a seamless manner cutting across levels and boundaries embracing all walks of life in the three sectors of the economy such as agriculture, manufacturing and services sector.

In this model, the inter-connectivity between these three sectors of the economy is brought about by four grids: namely, Knowledge

Grid, the Rural (7,000 PURA) Grid, Health Grid and the Governance Grid. Each grid is a system of multiple portals. The aim is to maximize gross domestic production and productivity of the land and people through maximizing the performance of each sector, synergized by the system of inter and intra-sectoral electronic connectivity to serve one billion people. This will bring prosperity to 700 million people in the rural areas and 300 million plus people in the urban areas. In the process, it will ensure that the lives of 260 million people will be uplifted from below the poverty line.

Societal transformation and economic growth are interlinked. Knowledge societies enrich information society through innovation. Information society enriches agriculture and manufacturing through value addition. The whole purpose of education in a country is to develop and enhance the potential of our human resource and progressively transform it into a knowledge society. The knowledge society will be a society producing products and services that are rich in both explicit and tacit knowledge, thus creating value added products. The real capital of this knowledge society will be its knowledge workers. The society will be highly networked to create knowledge-intensive environment along with enabling process to efficiently create, share, use and protect knowledge. Our education system should realign itself at the earliest to meet the needs of the present-day challenges and be fully geared to participate in the societal transformation.

When the world was moving from the industrial to information and knowledge era, we witnessed a changing pattern in the sectoral share of GDP and the number of people employed in each sector. The sectoral share of Gross Domestic Product (GDP) percentage has undergone a considerable change. Contribution of agriculture to India's GDP has come down from 39% to 22% during the period 1979 to 2005. During the same period contribution of manufacturing sector has moved from 24% to 27% whereas the contribution from the services sector has increased from 37% to 51%. There has been considerable change in the employment pattern also. The percentage of people employed in agriculture has come down from 64% to 54%. Simultaneously, the percentage of people employed in manufacturing has gone up from 15% to 19% and in the service sector from 20% to

27%. This trend has to continue and by 2020 our employment pattern should aim at 44% in agriculture, 21% in manufacturing and 35% in service sectors.

The displacement of 10% people from agriculture sector has to be facilitated through skill enabling for undertaking value added tasks in the rural enterprises so that migration to urban area is reduced. Instead of persons from the rural areas going to urban towns in search of jobs in manufacturing and services sectors, PURA (Providing Urban Amenities in Rural Areas) facilitates creation of employment in the rural area itself. PURA achieves this by providing physical, electronic and knowledge connectivities to a cluster of villages thereby leading to their economic connectivity and prosperity. Knowledge creation and knowledge utilisation is the key to the success of a PURA programme. Now I would like to talk about the characteristics of the knowledge economy.

I was studying different dimensions of knowledge society to see how would it be different from the industrial economy. In the knowledge economy the objective of a society changes from fulfilling the basic needs of all round development to empowerment. The education system instead of going by text book teaching will be promoted by creative, interactive self-learning – formal and informal with focus on values, merit and quality. The workers instead of being skilled or semi-skilled will be knowledgeable, self-empowered and flexibly skilled. The type of work instead of being structured and hardware driven will be less structured and software driven. Management style will be delegative rather than being directive. Impact on environment and ecology will be strikingly less compared to industrial economy. Finally, the economy will be knowledge driven and not industry driven.

India is now in the process of creating virtual universities and institutions for knowledge sharing, knowledge dissemination and knowledge reuse. While it is known that the Virtual Universities provide us with technologies of the future and the most economic way of scaling high quality education in the country, they are no substitute to the campus based education. The challenge before the

Virtual Universities is to provide the best of breed of both the worlds. In this process, we could plan an optimum mix of direct contact hours between the students and the teachers and also amongst the students themselves. These interactions should also be used as a platform to excite the students to take to learning in the new paradigm.

In the world of Virtual Universities the equitable access to all its participants is the primary goal. Unlike in the real world where the equitable access is always the democratic average, in the Virtual Universities the equitable access always means the equitable access to the best resources – be it the teachers, be it the library, be it the laboratory, available across the network. In effect, the network brings the best of its participants to every one of its participants. The three phases of learning are the lectures, library and laboratories. They require increasing bandwidth from a few 100's of kilobytes for the lectures to a few megabytes for the formal digital libraries and the informal world of knowledge from the Internet, to gigabits of connectivity for remote laboratories in the world of high precision science and engineering. As the bandwidth becomes cheaper and available in abundance, universities should be able to run remote instruments and facilities as complex as NMR to wind tunnels. These are applications that can make a difference in how we engage in teaching, learning, and research in higher education.

The world is moving towards internet2 applications. Internet2 applications require advanced networks. That is, these applications will not run across commercial Internet connections. Internet2 applications require enhanced networking functionality—such as high bandwidth, low latency (delay), or multicast—not available on our commercial Internet connections. Internet2 is about everything we do in higher education. Therefore, we encourage and support applications development in all disciplines from the sciences through arts and humanities. Whether you are in the classroom, the laboratory, the library, or the dorm, you should be able to access Internet applications that provide benefit.

This will ultimately provide equitable access to the entire education system beyond just the lectures and the lecturers. Thus the bandwidth

is the demolisher of imbalances and a great leveller in the knowledge society. We have rich knowledge institutions but what we have to add is connectivity. This connectivity today is technologically possible but would need creation of high bandwidth reliable network infrastructure to the extent of minimum 10 Gigabits per second all through the country to provide uniform access of knowledge in different regions leading to the creation of Knowledge Grid.

Ernet is the Educational and Research Network of India connecting 1500 institutions for internet and intra connectivity for email and other collaboration. Presently ERNET is connecting around 45 institutions across the country in a high bandwidth network with 100 mbps connectivity under the GARUDA project. This will become the part of the proposed Knowledge Grid.

So far I have discussed with you knowledge institutions. Now I would like to discuss on establishing the next network in the system of Grids across the country, namely, Health Grid.

Indian Space Research Organization through their INSAT network has connected 25 major hospitals in the mainland. From there they are providing telemedicine connectivity to remote areas including our islands. Rashtrapati Bhavan Clinic is also connected to the CARE Hospitals Hyderabad through telemedicine facility. Also there are a number of public and private initiatives, such as AIIMS, Apollo, Narayana Hridayalaya, Sankara Nethralaya, and Aravind Hospitals. There are exclusive tele-medicines etc. The mission of telemedicine with multiple grid is gaining momentum and it will spread to all the equipped Primary Health Centres in the country, medical colleges and research institutions in due course.

We need to establish a Health Grid, connecting the various health care institutions with regard to the super speciality and general medicine areas. Also health care training institutes, nurses, para-medical staff and doctors and the medical research institutions need to be networked to health grid. This will enable unique case studies and experiences to be exchanged between the super specialists through this health grid. It will also be possible to conduct conferences of specialist

doctors from multi-centres to discuss the critical disease patterns and provide treatment. In Rashtrapati Bhavan Website, we have a Virtual Vision applet, which will speech enable any website for the benefit of visually challenged persons. Thousands of people have already downloaded it and are using it.

As you are aware, with the arrival of space technology there has been an explosive growth of many low bandwidth networks for specific missions. There is a need to integrate the available networks and make it fast.

Let me first describe my personal experience in setting up and operating a typical e-Governance Portal established at Rashtrapati Bhavan.

Rashtrapati Bhavan has introduced connectivity with our citizens, institutions, universities, government departments and multi-lateral agencies during the last three years. For enabling such connectivity, all the important events in which the President participates are brought out in the website (www.presidentofindia.nic.in) as soon as the functions are over. Today, on an average, this website has a hit rate of over 250,000 per day. On certain special occasions, like Independence Day, Republic Day, it touches nearly a million hits. In addition, I receive over 500 e-mails and 500 letters on an average from various people from all over the country and abroad. I also receive hundreds of questions from the students and children every day. We have built in an e-Governance system to study all the correspondence on a day to day basis, analyze, prioritize, verify and determine the action requirements to be taken by Rashtrapati Bhavan and other agencies of government and the relevant institutions both public and private. We have now established a less paper dynamic and secured workflow system for the file movements. As the part of the e-Governance portal inauguration all the departments within Rashtrapati Bhavan were connected and the school, Clinic, Garage located in the President Estate were also connected. We have a Fibre broadband POP (Point of Presence) which can connect up to 64 Mbps. We have established within Rashtrapati Bhavan facilities for G2G and G2C connectivity and we are in the process of establishing the high bandwidth broadband VPN connectivity

with Central and State Governments and other relevant institutions for seamless flow of information within the existing systems and procedures of Governmental functioning. This will soon become the part of the e-Governance Grid.

Connectivity and Collaboration at RB: Apart from this we have had interactive collaborative conference with a number of institutions in India and abroad. The typical among these are:

- a. Interactive sessions with engineering students of Punjab colleges through VSAT and Leased Line.
- b. IGNOU connectivity to 100 locations through EDUSAT. So far we have connected 40 locations.
- c. Inauguration of Virtual University of Madras, Calcutta and Mumbai Universities with Anna University, Madurai Kamaraj University, 40 learning centres of IGNOU. Where I took the inaugural class through EDUSAT, tele-education delivery system and the multimedia studio at Rashtrapati Bhavan using PowerPoint presentation for over 15,000 students and answered over 20 questions, referred my talk from the website, referred some pages from two books from RB digital library, drawn the GSLV and Payload in the smart board. A virtual class room has been created during my one and a half hour interaction. The EDUSAT provided the necessary connectivity for the tasks.
- d. Interaction with the Carnegie Mellon University, Pittsburg, USA for Digital Library conference through Internet, three inaugural addresses through video conference with US institutions.
- e. PAN African Network – a Tele-Education Delivery system presentation to 28 African Union ambassadors through EDUSAT and Wi-MAX connectivity using the tele-education studio at RB.
- f. 25 national and international conferences in India through VSAT, ISDN with interactive sessions with educationists, teachers, space scientists, doctors, business communities through NASSCOM, judiciary and science writers.

- g. Interaction with Amrita Village Resources Centres and Kerala schools through EDUSAT, Loni Village connectivity through RF in Maharashtra.
- h. Interaction with Periyar PURA and MSSRF Village knowledge centres.

During these interactive discussions and conferences, I have used all the available electronic connectivities through VSAT, EDUSAT, and Leased lines, ISDN, Internet and Wi-MAX. Presently all these connectivities are fully established at Rashtrapati Bhavan and are highly effective. With the last three years of experience, I realize that to promote effective, quality and actionable communication we have to use multi-media comprehensively. This will be determined by the bandwidth availability.

No country has so far implemented an e-governance system for one billion people. It is a big challenge before us. Let us take an example to clarify the connectivity challenges of the country.

Good governance is being recognized as an important goal by many countries across the world. They have taken up specific initiatives for open government. Freedom of information is being redefined and supported by detailed guidelines. The internet revolution has proved to be a powerful tool for good governance initiatives. An important dimension of the internet potential is the possibility of providing services any time anywhere. Along with this there is a conscious effort to put the citizen as the centre of focus of the governance. Citizens are being perceived as customers and clients. E-governance has to be citizen friendly. Delivery of services to citizens is considered as a primary function of the government. Particularly in a democratic nation of a billion people like India, e-Governance should enable seamless access to information and seamless flow of information across the state and central government in the federal set-up.

I visualize an election scenario, where a candidate files his nomination from a particular constituency. Immediately the election officer verifies his/her authenticity from the national citizen ID database through multifactor authentication, through a multipurpose Citizen ID card. His education credentials come from the university records.

His track record of employment comes from various employers with whom he had worked. His income and wealth resources come from the income-tax department, and other sources. His property record comes from the registration of land authority across the country. His credit history comes from various credit institutions like banks. His/her civic consciousness and citizenship behaviour comes from the police crime record. His legal track records come from the judicial system.

All the details arrive at the computer terminal of the election officer within a few seconds automatically by the act of e-Governance software agents which crawls across the various state and central government web services directories through the network Grid and collects the information automatically and presents the facts in real-time without any bias. Artificial intelligence software analyses his credentials and gives a rating on how successful he will be as a politician. Election officer sitting at the remote block of the country decides on the spot and the election process starts. All the voters vote from their home through virtual polling booths. Is it a dream? Is it possible? If possible, when shall we have it? Can we provide good governance to our one billion people? Can the governance speed up the delivery system? Can the governance differentiate between genuine transactions and spurious transactions? Can the governance ensure immediate action for the genuine cases which satisfy the check list for a particular service and pend the action on spurious transactions? Can this be done by e-governance at a cost affordable by our nation? If we have this system implemented then I can call this as a true e-Governance system for the citizen.

NICNET in India is providing connectivity to Government organizations using 2-8 mbps connectivity. It also has an internet data centre with 80 terra bytes of storage and more than 150 servers connected for the missions such as election data and event oriented projects for the government organizations.

To establish a system what I have visualized, we need a high bandwidth broadband connectivity across the many Government departments such as State and District Administration, Election

Commission, Universities, Banks, Home/Police Departments, Insurance companies etc. This scenario requires vertical and horizontal grid established across various institutions. Hence, we can draw information and feed information from these Grids for seamless flow of data to achieve the goal of good governance.

For providing the knowledge connectivity to the PURA complexes, Village Knowledge Centres will act as frontline delivery system. I visualize establishment of village knowledge centre in the Village Panchayat to empower the villagers with the knowledge and to act as a local centre for knowledge connectivity for the villagers within the overall framework of PURA.

The Village Knowledge Centre should provide the essential data required for the targeted population such as farmers, fishermen, craftsmen, traders, businessmen, entrepreneurs, unemployed youth and the students. It has to be acquired by visiting the village, talking to the rural people, by understanding their requirement and core competence. Providing meteorological data for both farmers and fishermen has to be area specific, covering say 20 or 30 villages in the vicinity of sea coast or in the farming area. Local relevance of information offered is essential. Users have simple needs of information but often it is a tough problem for system integrators because of the need of updation of data. Trained manpower with experience have to be deployed to generate information which can explain to the people in simple terms the meteorological data, weather data, marketing data on fish, agricultural and other rural commodities. These data have to come from various connected institutions which provide the service to the people on a timely basis periodically. But the transformation of data into user friendly information on a regular updated basis is the real challenge. The main focus of the Village Knowledge Centre should be to empower the youth to undertake development tasks of the villages and establish the rural enterprises which will provide large scale employment to the youth of the village. So, it is essential to skill-enable and knowledge-enable through the academic institutions, industry, banking and marketing institutions. VKC should act as a facilitator. Blended knowledge is a better knowledge.

A low cost multi-task hand-held computer with GPS and wireless mobility should be developed by the private industries and organizations and should reach the fishermen and farmers in different parts of the country. They should add value to this tool for their benefit to increase their earning capacity. Village Knowledge Centre should have a computer terminal, wireless (Wi-Max) connections or fibre broadband or satellite connectivity to connect to the Nodal Centres for acquisition of knowledge and dissemination of updated real time data.

Each PURA should have “Nodal PURA Knowledge Data centres”, which should be the Hub for all the activities creating the vibrancy in the PURA as a viable sustainable business proposition. These “Nodal PURA Knowledge Data Centres” should be linked to the nominated domain service providing organizations in agriculture including fisheries, cottage and small scale industries and commerce, Education and human resource development and health care sectors. These domain institutions will have a mechanism to create continuously updated information systems needed to service the Village Knowledge Centres.

With this experience, we should make the village resource centres as the knowledge centres in the villages in a fully connected environment with a mission of skill and knowledge enabling people leading to sustainable economic development in the rural areas.

I have studied a system which is working and used by the farmers and fishermen in different parts of the country. This is called the Kisan Call Centre (KCC) established by the Ministry of Agriculture in partnership with TCIL (Telecommunication Consultant India Ltd) a Government Enterprise under Ministry of Communication and Information Technology.

Kisan Call Centre offers three levels of interaction and support in agriculture, fisheries and animal husbandry domains through the nationally nominated experts and corresponding directorates at the Central level. In the last one year of its operation the call centre has provided consultancy, information, assistance and guidance to over half a million callers from the villages of eight States. Anywhere in

India, people can call 1551 as a toll free number to get the services. The top users of the scheme are Maharashtra and Tamil Nadu followed by UP and Rajasthan.

As we have seen in the Kisan Call Centre set-up, similar Domain Service Provider Call centres are required in the field of Commerce and Industry, Entrepreneurial Skill Development and Employment Generation, Travel and Tourism, Banking and Insurance, Meteorological Forecasting, Disaster Warning systems, Education and Human Resource Development and Health Care.

These call centres will act as a service provider to the PURA Nodal Knowledge Data Centres located in the PURA Complexes, which in turn will provide the area specific and customized knowledge to the Village Knowledge Centres in the villages in a holistic manner. This delivery will depend on the availability of robust connectivity to different parts of the country. This forms the PURA Grids which draw information from the other Grids and will act as a catalyst for the societal transformation in the rural areas.

So far I have discussed with you the necessity for establishing various Grids by citing examples on how connectivity is important in e-Governance and knowledge institutions. Now I would like to discuss how to connect all the Grids across the country to fulfil the mission objective of entering into a knowledge society.

So far we have discussed the connectivities within the various proposed grids, that is, intra-grid connectivities. However, to maximize the synergy between the grids, leading to maximization of GDP and productivity, there is need for inter-grid connectivities, which may be called as Societal Grid. Knowledge sharing, knowledge utilization and knowledge re-use is very vital by all constituents of the society for promoting non-linear growth. Societal Grid consists of:

1. Inter connecting universities with socio-economic institutions, industries and R&D organizations.
2. Inter-connecting the Health Care institutions of Government, corporate and super specialty hospitals, research institutions,

educational institutions and ultimately, pharma R & D institutions.

3. Inter-connecting the Central Government and State Governments and District and Block level offices for G2G and G2C connectivity.
4. Connecting the PURA Nodal centres with the village knowledge centres and domain service providers. Since this is the backbone for rural development, all other Grids will infuse the knowledge into this Grid for sustainable development, health care and good governance. For example, five of the Periyar PURA villages have now connected using Wi-MAX connectivity.
5. Will act as an inter-connected delivery mechanism for tele-education, tele-medicine and e-Governance services apart from individual access by the people, within and between the Village Knowledge Centres through the PURA Grid.

These connectivity Grids will connect the billion people using the network available such as VSAT, fibre broadband, wireless and through mobile phones. Many options exist for the last mile connectivity in India. While wireless 802.11 and 802.16, the Wi-Fi and Wi-Max are becoming very popular everywhere, we still feel that there are enough opportunities for the fibre to the home users as well. This is due to the fact that the cost of fibre has come down drastically as also the cost of laying the cables. This has the potential to give near terabit connectivity or almost unlimited bandwidth to every rural and urban home.

In India we already have more than 400 channels of TV being beamed to every home. The Direct to Home (DTH) TV has become a reality. Imagine the high speed fibre to the home carrying all the entertainment, education, e-governance, e-commerce, health care, newspaper, telephone and all other forms of text, voice and video data, both synchronous and asynchronous data being pumped in and out through the fibre to the house! This will create a world of unlimited bandwidth.

In order to make the country the most advanced knowledge society, we should aim at making the bandwidth available without hindrance and at no cost. Making the bandwidth available is like the Government laying the roads. Movement of materials through these roads creates wealth in the industrial economy and the government recovers more than the investment on the roads by way of taxes and enhanced prosperity of its people. In the modern digital economy driven by knowledge products, bits and bytes traverse the network and create wealth and this will recover the cost of investments in the bandwidth.

The electronic connectivity for one billion people must transform into a network and provide a seamless access between

- the knowledge creator that is the Universities, Institutions and Government;
- The R & D institutions, Public and Private sector industries that convert knowledge into products and services; and
- The knowledge consumer that is the citizen.

With the dawn of the twenty-first century, the world has entered an era of depleting energy and water resources. Endemic oil shortages are looming large and need for renewable energy substitutes, such as bio-diesel has become mandatory. However, a massive programme for production of bio-diesel calls for deep integration and system engineering between various sectors of the economy.

To illustrate India's response to the oil crisis, as it affects our transportation sector, let us take large scale mission in *Jatropha* plantations for generation of bio-fuel partially or totally substituting diesel. The *Jatropha* plantation technology and methods are provided to the farmers by the agricultural university. The R & D institutions in the country work on converting *Jatropha* seeds into bio-fuel and by-products and also enhancing the combustion efficiency of internal combustion engines running on bio-fuel. Rural small scale industries will establish enterprises for producing bio-fuel and marketing it. The Rural Development and Agricultural Ministry in co-ordination with Ministry of Petroleum and Natural Gas and the State Governments would need to provide the policy framework for pricing and use of

bio-fuel. Also, there is a need for the University to work on the development of a variety of hybrid seeds for increasing the productivity of oil from the seeds. These complex interactions between various institutions have to take place as public-private partnership through electronic connectivity. Such a model is being developed and there are indications that the work already done in five states is accelerating unprecedented progress in this area over the last one year.

Thus we can see there is a closed cycle between the farmer, researcher, educational institutions, industry, government and the user requiring variety of knowledge input at different stages which can be made available effectively only if all these institutions are brought under knowledge grid and a common communication protocol with high speed access is made available to them.

Connectivity is the key to the conversion of billion people into members of knowledge society. Connectivity for the billion people is the connectivity of the planet; it means we are connecting 600,000 villages in a single country. This experience will become the foundation for other continents. The major effort should be towards making the bandwidth free and unlimited and available on demand for a billion people. Bandwidth will determine the prosperity level of our country.

My best wishes to the members of International Union of Radio Sciences in their mission of working towards a fully connected prosperous, safe and happy planet.

7

India and The World

India-Tanzania — Mutual Friendship and Solidarity

I EXTEND MY greetings to you and to the people of Tanzania. It is an honour for me to be in your midst today in your beautiful country. I would like to thank you for the very warm welcome given to me and to our delegation on arrival in Dar-es-Salaam. I am sure that my visit will strengthen our mutual friendship and solidarity. India has always had a special place for Tanzania in its foreign policy. Similarly Tanzania has a special place for India.

A geographical distance exists between our nations, but there are many commonalities between us. Some 2000 years ago, Indian travellers began sailing across the Indian Ocean to reach the East African coast mainly for the purpose of trade and commerce. Their small and sometimes sporadic ventures became more regular in the early 19th century. This is the result of the Indian philosophy.

It means, the whole world is our home, and every person in the world is a kith and kin. This process led to many Indians making your great nation as their home, leading to the creation of a pluralist and multi-religious society, which is a shining example of the African continent. I understand that the immigrant community has made many contributions to the economic and social development of your nation, especially in trade and industry. I am told that some of them even participated in Tanzania's Independence Movement. As we in India had struggled to rid ourselves of the colonial yoke, we also watched the continued dominance of Africa by colonial forces with concern and extended our full support for your freedom movement.

Ever since you attained your freedom, we in India have seen with admiration your nation's uninterrupted march as a standard bearer of unity, democracy, civilian rule, social cohesion and stability. The

Father of the Nation, Mwalimu Julius Nyerere's role and leadership in the fight against colonialism and racism is very well known in our country. Mwalimu Julius Nyerere was for long years in the vanguard of the anti-colonial struggle, racism and apartheid. Mwalimu Julius Nyerere and our first Prime Minister Pandit Jawaharlal Nehru laid the foundations for our strong mutual understanding on a wide cross-section of major global issues. This mutual understanding also extended to areas of vital interest to each other. Our leaders have since maintained a regular exchange of visits at the highest levels.

You have visited India in December 2002, which we remember with happiness. That led to the nucleation of a number of proposals for promoting bi-lateral relationship between our countries. I am visiting the African Continent when we together face the challenge of globalization and rapid technological advancement. Globalization today is a reality and a compulsion and the challenge is to implement policies, which cause minimum social disruption in our developmental process. In this, your visionary leadership is evident, Mr. President, as you have been a unanimous choice for the Co-chairmanship of the World Commission on the Social Dimension of Globalization.

Tanzania is a symbol of the evolving aspirations of a resurgent Africa wishing to pursue a democratic path for responsible governance and finding internal solutions to regional conflicts. Your country is a firm supporter of regional organizations and co-operation reflected by your personal efforts to revitalize regional integration efforts through institutions such as the South African Development Community and the East African Community. We in India are interested in seeing the robust economic development of your nation. We are very happy to note that Tanzania's economy has grown at a rate of about 5.5% in recent years, which is one of the highest rates of growth in Africa. Your government like ours has its major focus on economic reforms, liberalization, development and poverty alleviation.

Mr. President, my nation is also determined to forge ahead on the fast track of progress. We have a vision to become a developed nation by the year 2020. We are focusing on five areas of importance in an integrated manner. These are education and health care, agriculture

and food processing, information and communication technology, infrastructure development and self-sufficiency in critical technologies.

Both our nations have to face the challenges of the new millennium jointly through the strengthening of institutions. Tanzania has been a steady co-partner with India on this journey. There is an urgent need to democratize the functioning of the United Nations and the Security Council through its expansion to reflect the new global realities. One of the biggest challenges of the new millennium is the rise of terrorism across the globe, which is being experienced by every nation. We in India are determined to fight it. Terrorism has the potential to damage economies and the social harmony of open societies like ours. We in India understand your concerns on this account as terrorism in your neighbourhood can have an adverse impact on your tourism industry as well.

When I am back in the African continent, in your beautiful country, with many rivers and lakes including the Nile, I remember the poem which occurred to me while we sailed in the Blue Nile and reached the confluence of White and Blue Nile at Khartoum. Let me recite a small part of that poem: ...When we rivers confluence Oh humanity why not your hearts confluence And you blossom with happiness. ... It has been translated in Arabic by one of the Professors in Sudan.

Today, Mr. President, in the new evolving world, co-operation between India and Tanzania has taken new shape. Tanzanian students are making use of India's educational programmes. India's higher educational infrastructure is being made use of by many of your students who are enrolled in various institutions of learning. A sizeable number of Tanzanian students are studying in Bangalore, which is one of our prime information technology centres with world class IT companies operating from this city.

Tanzania and India can work on their many commonalities to develop synergies, which can lead to a win-win situation for both nations. Tanzania has minerals such as gold, diamonds and the semi-precious stone – Tanzanite. India has the expertise to process and add value to these minerals. Co-operation in this area could be thought of. Joint ventures could be worked out in the field of power generation

where we have experience in handling large grids. India can provide support in developing your nation's hydel power potential through induction of necessary inputs. Co-operation in the development of Tanzania's railway network can be thought of as India has one of the largest railway networks in the world. India's expertise and experience in operating a large railway network can be utilized by Tanzania to help it provide greater connectivity with its neighbouring countries. The oil and natural gas sector can be another area with promise in which avenues for co-operation can be explored. Since independence, India has achieved agricultural self-sufficiency and developed capabilities in this sector. India is willing to extend help in this sector by sharing its experience of growing hybrid varieties of rice and maize, which would be suitable for your land. On our part, we would like to gain from the experience of Tanzania in managing its world-famous wildlife sanctuaries and utilizing the associated eco-tourism potential.

I am visiting the island Zanzibar tomorrow and meeting the President of Zanzibar and his team. Also I will interact with the people of Zanzibar. I am sure it will be a memorable visit.

Excellency, before I end, I would like to take this opportunity to convey my greetings and that of my delegation for the warm and friendly hospitality that you have extended. This has further strengthened the deep bonds of friendship between our nations and their people.

Excellencies, Ladies and Gentlemen, may I now request you to join me in a toast to the:

- health and well being of His Excellency President Mkapa and Madam Anna Benjamin Mkapa;
- progress and prosperity of the friendly people of Tanzania; and
- further consolidation and strengthening of the traditional friendship between India and Tanzania.

India-Zanzibar — A Common Linkage

I AM DELIGHTED to meet the people of Zanzibar. This gathering includes a number of members of Indian community whose ancestors came to this island more than a century ago and settled down and engaged in many commercial activities.

When I landed at Zanzibar, I could see the beauty of this island and now I am seeing the beautiful minds of the people of Zanzibar. India and Zanzibar are connected by the Indian Ocean and the waves are reminding us all the time about our common linkage. When I am in this great island, I too was reminded of my birthplace and childhood in the Rameswaram island. I used to see two major activities: people fishing for their daily lives and another the great temple that attracted tourists daily from all over India and abroad. I saw harmony among the people of different religions and people coming as tourists. Here also I am seeing you living in harmony and brotherhood.

Over the years, Zanzibar had provided you a certain way of life. In return you all have a responsibility to provide certain goods and services to this country, which can make this country prosperous. I would therefore, recommend to all of you to carry out your tasks with dedication, commitment and loyalty. This will enable you to prosper in the days to come. Also, your children will imbibe these precious qualities which is essential for their future life. I would like to give some of my thoughts on the economic activity of this country that is indirectly relevant to your growth.

I understand that Zanzibar is famous for three things: clove, fish and fish products, and tourism. The conventional methods of marketing these products and services need certain change. Value addition for clove and fishing may provide better revenue and wealth generation.

All of you can certainly contribute with new ideas through which these trades in this region can flourish.

I would like to share with you the experience of fishing industry in a sea-coast country. Satellite images identify where there is a large fish concentration. There, a ship goes and catches lot of fish and stores in the deck. This catch is transferred to another ship, which carries out the entire process of cleaning, cutting and processing. The third ship comes and collects the entire packaged value added goods from the second ship for transporting it into the international market.

I visualize a similar situation in this island in the form of fish getting processed, valued added, packed and delivered to the market. This will boost up the economy of the Zanzibar and provide better living conditions for the people.

This island is one of the famous locations and sought-after place for many tourists from east and west. Tourism can be promoted through provision of quality infrastructure and facilities for the tourists. One area all the tourists strive for is to get reliable information about various tourist spots, their accessibility and how to add value to their stay in the country. Only people friendly tourist officers can provide this. I would recommend that some of you could take up the task of documenting the entire tourist map and provide value added information through research. Such an information base will attract many more tourists to this country which will be an asset for the country and it will provide adequate compensation and employment opportunities for all of you. Of course, the Government of Zanzibar will further improve the necessary infrastructure at various tourist locations to attract many more tourists from abroad.

I understand you have good schools in Zanzibar which provide quality education up to the level of 10+2. However, you seem to have certain problems for educating children in colleges. There are a number of distance education centres in India who are providing higher education within the country and certain centres abroad. I would recommend extension of higher education facilities for Zanzibar children through tele-education by Indian distance education centres. Indian High

Commission in consultation with the educational authorities can work out this possibility.

For overall development of citizens and success in whatever profession you pursue, righteousness in thinking, conduct and action is the key. I would like to recite a divine hymn, which I heard in a spiritual centre:

Where there is righteousness in the heart

There is beauty in the character.

When there is beauty in the character,
there is harmony in the home.

When there is harmony in the home.

There is an order in the nation.

When there is order in the nation,

There is peace in the world.

My best wishes to all of you for growth and prosperity in your profession and family life. May God bless you.

Evolution of Empowered Society

I AM INDEED delighted to be in Moscow University and address the students and faculty members of this prestigious University. When I am in the University of Moscow, I realize that this university has got a great tradition and history. It has been established in the year 1755. Just when I was entering into your campus, I am reminded of an event which took place a few weeks back in India.

I witnessed on 27th April 2005, in the Rashtrapati Bhavan, an agreement being signed between three Indian Universities which are hundred and fifty years old namely University of Madras, University of Bombay and University of Calcutta for reinforcing the curriculum of each other, enhancing the research programmes and quality of teaching through synergy between the Universities for transforming them into great educational centres of 21st century. The similarity between the University of Moscow and the three Universities is that all have a long history and tradition but the three Indian Universities are younger by hundred years in comparison to University of Moscow. There are also a few other institutions of learning and scholarship in India which have a long tradition. With its innate strengths in humanities, arts, science, technology and culture Moscow University and our three Universities can have co-operative programmes for exchanging teachers, researchers and students. Even we can establish a school of societal transformation which can transform our nations into knowledge society.

We have multiple societies in every nation starting from agricultural society, industrial society, and information society leading to knowledge society. During the 20th century, societies underwent a change from the agricultural society, where manual labour was the critical factor, to the industrial society, where the management of technology, capital,

and labour provided the competitive advantage. The information era was born in the last decade. Networking within the country and with the other nations and the software products drove the economies. Some of the nations including India utilized this opportunity. In this decade we are just entering into knowledge society era.

The uniqueness of knowledge society is enriching the information society with innovation and value addition of products. The knowledge also enables value addition to the other three societies. In knowledge society, knowledge is the primary production resource instead of capital or labour. In India, I chaired a task team constituted by the Government of India sometime back for evolving a road map for transforming the Indian society into a knowledge society. I would like to discuss with you how we can work together to make our societies enriched by knowledge and transforming them into knowledge society.

Knowledge can create a comprehensive wealth for the nation and also improve the quality of life, in the form of better health, education, infrastructure, and other societal needs. The ability to create and maintain a knowledge society infrastructure, develop the knowledge workers, and enhance their productivity through the creation, growth, and utilization of new knowledge, will be the key factor in deciding the prosperity of this knowledge society. Whether or not a nation has developed into a knowledge society is judged by the way it creates and deploys knowledge and skills in the sectors like ICT, manufacturing, agriculture, health care and many services.

I was studying the dimensions of knowledge society and how will it be different from the industrial economy. In the knowledge economy the objective of a society changes from fulfilling the basic needs of all round development to empowerment. The education system instead of going by text book teaching will be promoted by creative, interactive self learning, formal and informal with focus on values, merit and quality. The workers instead of being skilled or semi-skilled will be knowledgeable, self-empowered and flexibly skilled and would adapt to newer technologies seamlessly. The type of work instead of being structured and hardware driven will be less structured and software driven. Management style will emphasize more on delegation rather

than giving command. Impact on environment and ecology will be strikingly less compared to the industrial economy.

Hence the economy will be knowledge and skill driven and not by established industries. There will be continuous innovation and enterprise. To realize this special capacity needs to be built in education and nurtured among the students. The capacities which are required to be built are research and enquiry, creativity and innovation, use of high technology, entrepreneurial and moral leadership.

Research and enquiry: The 21st century is about the management of all the knowledge and information we have generated and the value addition we bring to it. We must give our students the skills with which they find a way through the sea of knowledge that we have created and continue with life long learning. Today, we have the ability, through technology, to really and truly teach ourselves to become the life-long learners. This is required for sustained economic development.

Creativity and innovation: The management of knowledge in the 21st century is beyond the capacity of a single individual. The amount of information that we have around is overwhelming. The management of knowledge therefore must move out of the realm of the individual and shift into the realm of the networked groups. The students must learn how to manage knowledge collectively. When the information is networked the power and utility of the information grows as squared as predicted by Metcalfe's law. An information that is static does not grow. In the new digital economy information that is circulated creates innovation and contributes to national wealth.

Capacity to use high technology: Every student in our schools should learn to know how to use the latest technologies for aiding their learning process. Universities should equip themselves with adequate computing equipment, laboratory equipments, and Internet facilities and provide an environment for the students to enhance their learning ability. In the midst of all of the technological innovations and revolutions we cannot think that the role of the teachers will be diminished. In fact the teacher will become even more important and the whole world of education will become teacher assisted and would

help in “tele-porting” the best teacher to every nook and corner of the country and propagate the knowledge.

Entrepreneurship: The aptitude for entrepreneurship should be cultivated right from the beginning and in the university environment. We must teach our students to take calculated risks for the sake of larger gain, but within the ethos of good business. They should also cultivate a disposition to do things right. This capacity will enable them to take up challenging tasks later.

Moral leadership: Moral leadership involves two aspects. First it requires the ability to have compelling and powerful dreams or visions of human betterment. Moral leadership requires a disposition to do the right thing and influence others also to do right things.

In sum, inquiry, creativity, technology, entrepreneurial and moral leadership are the five capacities required to be built through the education process. If we develop in all our students these five capacities, we will produce “Autonomous Learner” a self-directed, self-controlled, lifelong learner who will have the capacity to both respect authority and at the same time is capable of questioning authority in an appropriate manner. These are the leaders who would work together as a “Self-organizing Network” and transform any nation into a prosperous nation. Now I would like to discuss our Scientific Strengths.

Russia has got a tradition of strength in metallurgy. The periodic table was given to the world by Mendeleev. You became the pioneers in space launch systems by putting the Sputnik in the orbit. Kirchhoff gave the Kirchhoff laws to the electrical network theorists. Kirchhoff and Bunsen discovered two new elements, caesium and rubidium in the course of their investigations. Kirchhoff was best known for being the first to explain the dark lines in the sun’s spectrum as caused by absorption of particular wavelengths as the light passes through gases in the sun’s atmosphere. This work started a new era in astronomy. Landau’s contributions to theoretical physics are phenomenal. Korolov was the rocket designer *par excellence* who launched the first modern liquid-fuelled rocket in 1933. Konstantin Tsiolkovsky of Russia was considered as one of the fathers of space exploration. Tsiolkovsky blended the passion for space with hard mathematical calculations to

produce the vision for the future. He imagined a time when space ships would be launched from the Earth to large space stations and colonies; from there he proposed these ships would propel humanity to explore the Moon and Mars. His thought has influenced many space scientists and technologists.

Similarly another event which greatly influenced me in India was a war between British in Sri Rangapatnam and one of the warriors in India Tipu Sultan. Tipu Sultan, the ruler of Mysore State, in the war against the British, used war rockets against the cavalries and defeated the British force in 1792. He was the first in the world to introduce rocket force in the Army. Though India was a latecomer in the modern space activities, it is one of the five nations today which placed its own satellite using indigenous GSLV. We in India also remember the pioneering contributions to science made by Chandrasekhar Subramaniam for his Chandrasekhar limit and black hole, Sir C.V. Raman for his discovery of the “Raman effect”, Srinivasa Ramanujan for his contributions towards number theory, J.C. Bose in the area of microwaves and Meghnad Saha for “Thermo-Ionization Equation”.

Russia and India have a tradition of knowledge and have civilizational strength. We also share a common vision of the world of bringing prosperity, peace and partnerships to the whole of humanity. Through these strengths and commonly shared vision, we can definitely build a prosperous society. A prosperous society with civilizational strength will lead to peace. Let us commence a new journey in this planet to bring global peace and prosperity.

India-Ukraine — A Common Bond of Democracy

I WOULD LIKE to thank you for the warmth of your welcome and the hospitality extended to me. I am honoured and privileged to be in this ancient city of Kyiv, the cradle of a great civilization, which has had a widespread impact in the region.

India and Ukraine share traditional ties of friendship, trust and co-operation, which go back to many decades and have stood the test of time. The common bond of democracy is a new link. The discussions held between us today bear testimony to the strength of our close partnership and re-affirms our friendly ties. We remember with gratitude the work of Ukrainian engineers and scientists who helped us in our national development and in the construction of what our former Prime Minister called the “temples of modern India”, our factories, steel plants and hydro power projects. I am happy to note that India and Ukraine have very productive exchanges and co-operation in the area of science and technology and space. These exchanges have been to our mutual benefit and I am confident that experts from both our countries would continue to work together to strengthen these ties and expand collaboration in new areas such as molecular biology, genetics, stem cell research, information technology, material sciences and other areas of mutual interest.

It is a matter of satisfaction that our bilateral trade doubled itself in 2004 compared to what it was two years before and today reflects a healthy figure of about \$700 million. I believe that we expect to reach one billion dollars by 2006. There are many opportunities for co-operation between the two nations, which has the potential to enhance the trade and business to minimum \$5 billion by 2010. I am confident,

given the interest and commitments that exist in both countries, that we will meet this target. We also need to focus on promoting investments and reducing trade barriers. Many Indian companies are present in Ukraine.

At the same time Ukrainian entrepreneurs could look for opportunities for trade and investment in India. India has emerged as a competitive provider of goods and services to the world economy. As such it may make sound business sense for Ukraine to source, for example, pharmaceuticals or information technology services from India. Our common efforts should contribute to taking our economic and commercial relations to higher levels.

We are living in a globalized world and there is a healthy growth in our interdependence. There are critics of this process who are worried by the impact of globalization on the poor. We are responsible members of the world community, and democracies have the responsibility of ensuring that globalization of the world economy takes place in an equitable manner and that right of the weak and poor are not trampled. Our march towards the future has to be consistent with the principles of equity and democracy.

In the above context, changes are needed in the world's multilateral institutional architecture. The UN is an august and widely respected body which enjoys the trust and faith of our two countries. However, it does not fully reflect the realities in today's fast changing world. One of my Government's foreign policy priorities is to seek greater democratization of the UN and its Security Council.

I have been moved by the respect and admiration for and depth of knowledge of Indian culture and art shown by the Ukrainian people. Cultural contacts between our two great nations will help strengthen bilateral ties and the foundation of friendship at the people to people level. Consciousness about Indian spiritual and cultural traditions also permeates in the thinking of the greatest sons of Ukraine. In this context, Ivan Franko's *Hymn to Buddha* so eloquently captures the quintessence of Indian spiritual thought and at the same time the ephemeral nature of power.

“All hail, Buddha, to thee!
The light of our dark life!
Thou miracle, thou world
Of peace in furious strife!
Majestic, placid, still,
Thou didst eradicate
The allurements of a throne,
The powers of love and hate.”

May I now request all the distinguished guests to join me in raising a toast:

- to the personal good health and happiness of His Excellency Mr. Viktor Yushchenko, President of Ukraine and Madam Yushchenko.
- to the well-being and prosperity of the people of Ukraine; and
- to the friendship between India and Ukraine.

India-Africa — For Focussed Missions

I AM DELIGHTED to participate in the India-Africa Project Partnership 2005 “Expanding Horizons” organized by Confederation of Indian Industries (CII) and EXIM Bank. My greetings to the organizers, Hon’ble Ministers, Principal Advisors, Bankers, Business Captains, representatives of Chambers of Commerce and Industries and Government representatives participating in this Conclave. Particularly, I would like to greet the delegates of 31 African countries who are participating in this Conclave. I understand that the first Conclave resulted in discussions on 178 projects valued at US \$ 6 billion for further partnership and also signing of 12 MoUs. In this Conclave you have discussed specific participation of Indian business leaders in African projects. You have also had interaction with institutions for long term involvement in capacity building. I am sure that these interactions will lead to new partnership between Indian industry leaders and African industry leaders and result in the establishment of new enterprises in Africa and India based on the core competence of both the countries.

I am happy to note that as part of New Partnership for Africa Development and TEAM-9 projects valued at \$360 million have been approved and letters of credit opened. Also 15,000 students from different parts of Africa study in India and 1000 officials from Sub – Saharan Africa receive training annually in India under ITEC Programme.

I studied the number and profile of participants of both India and Africa who attended the first Conclave held in March 2005 and attending the second Conclave being held now. It is really a high level participation. In addition CII and the EXIM bank have provided certain inputs for the Conclaves. In spite of that I consider there is a large scope for improvement in the quality of output which has resulted

Address at the Valedictory Function of the Conclave on India-Africa Project Partnership 2005 “Expanding Horizons”, New Delhi, 8 November 2005

from these two Conferences. That would need active participation from both the Governments, focussed programme definition by industry captains and also creation of clearance mechanisms for faster decision process by both the countries.

During the last two years I had an opportunity to visit African countries such as Sudan, Tanzania, Tanzania-Zanzibar and South Africa. Also I had an opportunity to address the Pan African Parliament on 16 Sept 2004, at Johannesburg, South Africa which was attended by Heads of 53 member countries of the African unit. There I announced the willingness of Government of India to provide seamless and integrated satellite, fibre optics and wireless network connecting 53 African countries. This will provide three connectivities: (i) Heads of the State Network for e-governance (ii) Tele-education network for higher education, skill enhancement and capacity building and (iii) Tele-medicine for providing health care and super specialty medicare. This programme will be funded by India. This network will be in position by early 2007.

Now, I would like to give the sequence of events which took place before final signing of the MoU between India and African Union for implementation of Pan-African e-network project. As soon as the project was announced a technical committee was appointed by Prime Minister's Office (PMO) to generate the project report. The derivation of the project report took four months and needed six meetings of the technical experts drawn from Department of Space, Rashtrapati Bhavan, Ministry of External Affairs (MEA) and Telecommunications Consultants India Limited (TCIL). MEA had also interacted with African Union (AU) and member countries in this period. After the submission of the project report, PMO reviewed the project two times. Then PMO directed MEA to submit the project to AU. MEA organized a presentation of the project report by a high level team to Chairman and members of the AU. AU also constituted a Technical Review Committee consisting of members drawn from AU and International organizations. The final presentation was made by the Indian team to the Technical Review Committee which observed that this proposal is in line with the missions and objectives of the African Union and provides tremendous potential for achieving the MDG (Millennium Development Goals) through the use of innovative ICT. Meanwhile

I made a presentation of the whole project to the 28 Ambassadors of Pan African countries stationed in Delhi at Rashtrapati Bhavan. They also visited ISRO and saw the operational tele-medicine facilities. After this event MoU between AU and India has been signed on 27th October 2005. It can be seen with the persistent efforts of PMO, MEA and AU, a comprehensive robustly reviewed, mutually agreed project proposal for implementation of the state-of-the-art Pan African e-network has been evolved within a year, due to the focussed participation of all the stakeholders in the system.

I am giving this example to illustrate how with focussed attention a Government system has been able to perform in a time bound manner. In the case of private sector enterprises who have much more autonomy of operation, they should definitely be able to achieve higher level of results if they follow a focussed approach to project conceptualisation, formulation and implementation. CII and EXIM bank should study the specific problem faced by the business leaders and carve out a definitive problem solving session with various constituents of the decision making machinery. Here I would like to mention that AU and India can conduct a survey and short list a few consultants both in India and Africa for the preparation of robust project reports, which will meet the needs of the policies and procedures, enunciated by both the Governments from time to time.

As all of you will agree with me India and Africa are natural allies. We have many things in common and we have a common civilizational heritage. We have a historical link right from when Mahatma Gandhi sowed the seeds of Ahimsa dharma in South Africa. Also Africa has great leaders of international status like Mwalimu Nyerere, Nelson Mandela and Martin Luther King. Now India is in the process of transforming itself into a developed nation by the year 2020. Hence I would like to present our national challenges and plans. I am sure that this may be relevant to many of the countries in the AU.

Our nation is going through a major challenge of uplifting of 260 million people who are below the poverty line and also to give better life for many millions who are on the border line of poverty or just above the poverty line. They need a decent habitat, they need

work with reasonable income, they need food, they need speedy access to health care, and they need education and finally they need a good life and hope for a better future. Our GDP is growing at more than 7% per annum on an average, whereas, the economists suggest that to uplift the people from below the poverty line, our economy has to grow at the rate of 10% per annum consistently, for over a decade.

To meet the need of one billion people, we have the mission of transforming India into a developed nation. We have identified five areas where India has a core competence for integrated action: (1) Agriculture and food processing, (2) Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country, (3) Education and Health care, (4) Information and Communication Technology, and (5) Strategic sectors. These five areas are closely inter-related and if properly implemented, will lead to food, economic and national security of our country.

Emphasis should be on full utilization of natural and human resources of the nation to meet the demands of the modern society. We should also remember that about 50% of our population is young people with aspirations for better living. Value addition in agriculture, manufacturing and service sectors, building the national core competence and technologies will lead to additional high income employment potential. The engines for growth will be accelerated by launching of the five national missions, viz. water, energy, education and skills, infrastructure and employment generation. The totality of these five missions will enable achievement of 10% GDP growth rate per annum. It is possible to do so with ecological and economic sustainability. It is not the mission of governments. It is a collective effort of big and small businesses, science and technology and academic institutions, foreign investors, and many others who have confidence about India.

With these aspects in view, we have already laid down the road map. The priority for the government is to convert the road map into various missions. It is to be done in a decentralized manner allowing a greater role for private enterprise and local initiatives. While converting the vision into different missions we seem to have many thoughts

and variety of routes to reach the goal. This is where there is a need to have a coherent thinking among all the members of the society, including the legal and law and other agencies. All of us have to think that the nation is greater than an individual or an organization. All of us should believe that “we can do it”. The key question before us is: How to create such an enabling environment?

Let me discuss some of the national missions that India is giving thrust to for achieving sustainable economic development for all the regions of the nation. I am sharing these missions with the members of this Conclave, so that you may like to replicate this model in your countries. First I would like to talk about agriculture and agro food processing.

India is now producing about 200 million tonnes of food grains, as a result of the first green revolution piloted by the political leadership of Shri. C. Subramaniam, the scientific leadership of Dr. M.S. Swaminathan and willing farmers. India has now embarked on Second Green Revolution which will enable increase in productivity and diversification of the agricultural sector. The second green revolution will have the farmers in focus, farming technology as the friend, food processing and marketing as partners and the consumers as customers. From now on to 2020, India will gradually increase the production to around 400 million tonnes of grains. The increase in the production will have to be done under the reduced availability of land from 170 million hectares to 100 million hectares with reduced water availability. We should also learn to diversify to meet specific consumer preferences, export markets and also in the interest of ecological balance. This is to be achieved through information access to all stakeholders and not with central controls or restriction of movements of agro products. Now, I would like to discuss about PURA.

The number of PURA units for the whole country is estimated to be 7000. This envisages integrated connectivities to bring prosperity to rural India. These are—physical connectivity of the village clusters through quality roads and transport; electronic connectivity through tele-communication with high bandwidth fibre optic cables reaching the rural areas from urban cities and through internet kiosks; and

knowledge connectivity through education, vocational training for farmers, artisans and craftsmen and entrepreneurship programmes. These three connectivities will lead to economic connectivity through starting of enterprises with the help of banks, micro credits and marketing of the products.

Each PURA cluster will connect about 20 villages depending upon the region and population and will cost about Rs.100 crores (~\$20 million). After initial short-term employment during construction etc., we have to plan for initiating actions for providing regular employment and self-employment opportunities in nationally competitive small enterprises in agro processing, manufacturing and services sectors for about 3000 people. If the industrial/business parks are marketed well, they can generate employment opportunities in support sector for about 10,000 people in that cluster. This will provide sustainable economy for the rural sector. In this national mission, bankers can promote entrepreneurship in the rural areas. This will lead to the removal of urban-rural divide. This experience can become a model for other countries to follow.

Last year I had visited Periyar Maniammai College of Technology for women and inaugurated a project called Periyar PURA (Providing Urban amenities in Rural Areas) Complex. Over 65 villages near Vallam, Thanjavur district of Tamilnadu, have been transformed as a PURA cluster. This PURA complex has all the three connectivities—physical connectivity, which has a circular road and interconnecting roads covering major villages along with bus transport system, it provides electronic connectivity through internet kiosks and knowledge connectivity through its academic background—leading to economic connectivity to the 65 villages.

The centre of activity emanates from the women engineering college that provides the electronic and knowledge connectivity. Periyar PURA has health care centres, primary to post-graduate level education and vocational training centres. This has resulted in large scale employment generation and creation of a number of entrepreneurs with the active support of 850 self-help groups.

They have innovative water management schemes for irrigation and providing potable water for all the village citizens. All 65 Periyar

PURA villages are having only rain fed irrigation. 200 acres of waste land has been developed into cultivable land with innovative water management schemes such as contour ponds and water sheds for storing and irrigating the fields. All the villagers are busy in either cultivation, planting *Jatropha*, herbal and medicinal plants, power generation using bio-mass, food processing and above all running marketing centres. Due to shortage of rainfall in that locality, farmers were suffering due to scarcity of water not only for agriculture but also for drinking purposes. Keeping this in mind, Periyar PURA developed six percolation ponds and five check dams to harness the rain water amounting to 2.73 lakh cubic metre per year. This water is supporting the irrigation of 300 acres of land through recharging their open wells and bore wells. It also supplies drinking water to the people. Periyar PURA has also developed alternate practices such as Contour lands, check dams across natural streams for water conservation and developed a model for irrigation for conservation of water. More than 5000 farmers are benefiting from this programme. This example will be useful for water management in PURA complexes. Recently Periyar PURA has brought a number of employment oriented schemes to the Tsunami affected Nagapattinam villages and trained the Self-Help Groups on tiles making, paper manufacturing, alternative building blocks manufacturing and a number of commonly used items required in the rural and urban markets. This single women engineering college has empowered the villagers through the skills oriented training, provision of finance and provision of market connectivity for their produce.

Recently, I visited a place called Loni in Maharashtra where a participative model of integrated rural development has come up among 44 villages with a population of 80,000. The architect of this model Shri Bala Saheb Vikhe Patil, MP of Maharashtra has a vision of improving the productivity of the rural people through improved quality of life with health care, education and employment. The concept is people-centric development for social transformation. The thrust area of development has been on comprehensive medicare particularly for women and children, need-based health education and e-connectivity to the farmers. The complex has created 27 educational and vocational institutions consisting of schools, colleges, polytechnic and ITI including

medical and engineering colleges. They have created a sugar factory, bio-grass plants, chemical plants and power projects. They have a large number of self-help groups for providing low interest loan for the weaker sections in the society. Due to the co-operative effort of the people, literacy in these villages has gone up from 63% to 83%, birth rate has come down 2.3% to 2%, infant mortality rate has decreased to 35 per 1000 from 70 per 1000 and the standard of living of the people has gone up by over 20% compared to other village clusters in the neighbouring areas.

Government has decided to permit mixing of 10% bio-fuel with diesel. This has opened up new opportunities for employment and wealth generation. We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares of wasteland has been allotted for tree plantation. Certain multi-purpose trees such as *Jatropha* can grow well in wasteland with very little input. Once grown the crop has fifty years of life. Fruiting can take place in this plant in less than two years.

It yields oil seeds up to five tonnes per hectare per year and produces two tonnes of bio-diesel. Presently, the cost of bio-diesel through the plant is approximately Rs. 17 to Rs. 19 per litre which can be substantially reduced through choice of right size of the plant and using high yield variety plantation. Bio-diesel plants grown in 11 million hectares of land can yield a revenue of approximately Rs. 20,000 crore a year and provide employment to over 12 million people both for plantation and running of the extraction plants. This is a sustainable development process leading to large scale employment of rural manpower. Also, it will reduce the foreign exchange outflow paid for importing crude oil, the cost of which is continuously rising in the international market. Moreover, use of bio-fuel is CO₂ emission-free. This oil can also be used for soap and candle industries. De-oiled cake is a raw material for composting. Also *Jatropha* plantation provides a good environment for honey production. We should absorb best of the technologies available worldwide and start commercial operation soon. I would request the banking community assembled here to take the initiative, generate detailed project report in collaboration

with technical agencies on this project and promote entrepreneurs with financial support from the banks in rural areas who can undertake the plantation and commissioning of extraction plant leading to production of cost-effective bio-fuel. I am sure the bio-fuel plants can grow in many parts of Africa. Can there be a better project than this for coherent development of our rural sector in our countries?

It is reported that in India the number of HIV infected people is on the increase. It is critical that the transmission of HIV infection is prevented. An effective vaccine that can prevent this disease will be a cost effective tool for control of infectious diseases. There are three sub-types of viruses classified as A, B and C. I understand that Indian population is largely affected by sub-type C virus.

There are two candidate vaccines presently considered for use against sub-type C virus in our country. In view of the urgency of finding a cost-effective vaccine, the expert group reviewed the vaccine candidate for HIV sub-type C in the pipeline. Adeno-Associated Virus (AAV) based vaccine with HIV-1 sub-type C (African strain) developed by Targetted Genetics Corp, USA was found to be in advanced stage of test in different parts of the world. This HIV vaccine (tgAAC09) is now undergoing Phase-I trial for safety and immunogenicity assessment in healthy HIV uninfected volunteers at National AIDS Research Institute, Pune.

The Indian vaccine has been developed by scientists from National Institute of Cholera and Enteric Diseases in collaboration with National Aids Research Institute, Pune and Therion Biologics, USA. This is a recombinant vaccine containing six genes from HIV 1-C strain. This vaccine was developed from the virus isolated from National Aids Research Institute, Pune. This will go into Phase-I trial in healthy uninfected adults at Tuberculosis Research Centre, Chennai during this year. Both these programmes are being progressed as a joint venture between ICMR, National Aids Control Organisation (NACO) and International Aids Vaccine Initiative. In addition to these two vaccines a DNA based vaccine and SFV vaccine are also under development.

Time has now arrived to take up this development in a mission mode so that an effective vaccine will be available for our countries

within the next two years. Simultaneously, I would suggest that the medical community must start working on the development of anti-vaccines for sub-types A and B also. India and Africa can definitely work together in this programme.

The electronic connectivity for one billion people must transform into a network and provide a seamless access between knowledge creator, converter of knowledgeable products and the knowledge consumers. This can be achieved through the creation of knowledge grid, health grid, governance grid and PURA grid.

To maximize the synergy between the grids, leading to maximization of GDP and productivity, there is a need for inter-grid connectivities, which may be called as societal grid. Knowledge sharing, knowledge utilization and knowledge re-use is very vital by all constituents of the society for promoting non-linear growth. Societal grid consists of:

1. Knowledge Grid – Inter connecting universities with socio-economic institutions, industries and R&D organizations.
2. Health Care Grid – Inter-connecting the Health Care institutions of Government, Corporate and Super specialty hospitals. Research institutions, educational institutions and ultimately, Pharma R & D institutions.
3. E-Governance Grid – Inter-connecting the Central Government and State Governments and District and Block level offices for G2G and G2C connectivity.
4. PURA Knowledge Grid – Connecting the PURA nodal centres with the village knowledge centres and domain service providers. Since this is the backbone for rural development, all other Grids will infuse the knowledge into this Grid for sustainable development, health care and good governance. For example, five of the Periyar PURA villages are now connected using Wi-MAX connectivity, which will act as an inter-connected delivery mechanism for tele-education tele-medicine and e-Governance services apart from

individual access by the people, within and between the Village Knowledge Centres through the PURA Grid.

In order to make the country the most advanced knowledge society, we should aim at making the bandwidth available without hindrance and at no cost. Making the bandwidth available is like the Government laying the roads. Movement of materials through these roads creates wealth in the industrial economy and the government recovers more than the investment on the roads by way of taxes and enhanced prosperity of its people. In the modern digital economy driven by knowledge products, bits and bytes traverse the network and create wealth and this will recover the cost of investments in the bandwidth. Cost effective creation of the four Grids and inter connectivity between Grids is the profound platform for collaborative research, development and deployment.

I have shared with you certain thoughts on development and also certain key accomplishments, which has been realized so far. There is substantial scope for co-operation between Africa and India, which can provide a better quality of life for the people of both nations. Both the countries have a large bio-diversity, substantial amount of natural resources and hard working human resources. Also, Africa and India are aspiring to become developed countries. What we need is to identify the core competence of each one of us and match the core competence with the economic and societal needs of a particular nation. The connectivity is the key for marching towards our goal of development in a faster pace than what we have been doing so far. Knowledge creation, knowledge sharing and knowledge dissemination are the vital components for our growth. I am sure that the future Conclaves will provide focussed opportunity for both the countries to move towards the development goals in a coherent manner.

My best wishes to the members of this Conclave in their mission of expanding the partnership horizons of India and Africa for their mutual benefits.

8

Defence

Leadership for High Altitude Battle

TODAY I HAVE VISITED Kumar, and the Siachen Battle School in Base Camp-1. When I was flying from Thoise to Kumar and back, I was witnessing the challenge of snowy terrain with fast winds. Now I am with you. Your Brigade has a tremendous responsibility for defending the Siachen Sector, in varied seasons under heavy snow fall and against incessant gun firings some times. Now I know the guns are silent. The 75 kms long, 2 to 4 kms wide Siachen glacier is of extreme geo-strategic importance where our Indira Pol meets POK and Aksai Chin. Many battles have been fought during the last 20 years to establish our supremacy. It is a war of deeds. You have defended it with valour and blood. Your will power and love for the nation are the most powerful battle winning weapons. A strong mind and physique is an asset for national security and provides leadership to high altitude battle.

Nation realizes that you are encountering not one adversary but two. One across the border and the other the inhospitable nature. We recognize that you are fighting a battle at the highest altitude in the world. It is the duty of the nation to ensure your welfare and happiness and the happiness of your families at all times. You must remember that when 102 Brigade is defending Siachen sector you are not only defending India's territorial integrity and water resources but you are also partnering in and fueling the economic development mission of the nation which will make our children live in a happy, prosperous and safe India.

I know that the Indian armed forces are one of best in the world, perhaps the best. Not only am I saying this, the whole international community speaks about this. This is amply demonstrated by your brave performance during the four wars in 1948, 1965, 1971 and 1999. You have also participated in many international and UN peace-keeping

missions and performed extremely well. We are proud of your achievements.

The troops in Siachen sector have to be always alert with very fast reaction time. But I can assure you that the nation is fully conscious of its responsibility in enhancing troops survivability, sustainability, efficiency and motivation with cheers. Nation has a comprehensive security plan. We are also having diplomatic approach for peace; some positive and encouraging signs are visible along the western and northern borders. There is a sustained effort to modernize all the three wings of the armed forces and equip them with the latest and the state-of-the-art technologies with sufficient resources allotted.

I am sure this brigade has all the necessary winter clothing, food with sufficient calories, modern reconnaissance equipments and attack weaponry for mountain warfare. From base camp you have to walk for a few days to reach your post. At that time apart from winter clothing you should use thermally heated shoes and should carry a map indicating possible avalanche prone areas and crevasse mapping using Ground Penetration Radar, which is likely to be available very soon. I would recommend our troops to get trained in the usage of handheld GPS, while moving from base camp to post and post-to-post and patrolling. When I was Scientific Advisor to Raksha Mantri, after visiting Siachen in April 1998, I gave priority to five defence labs to conduct R&D to provide specific operational support to Siachen Sector. Now, I am being assured, that the fruits of those R&D efforts results are coming in. Fresh vegetables and milk for the Jawans, lighter weapons, lighter uniform and efficient reconnaissance equipment have become a reality today for our Jawans. I would like to see that the Partapur detachment of Field Research Laboratory (FRL) supplies certain types of vegetables and fresh milk all through the year. This can also be augmented by the main FRL through a well-organized movement plan between Leh and Base Camp.

I understand that now it is possible with Ground Penetration Radars fitted on the helicopter/aircraft, one can map the crevasses with good accuracy. Definitely this GPR system in combination with GPS will be made available to the 102 Brigade. During patrolling, I understand that the soldier has to carry his payload requirements such as food, clothing, water, weapons and ammunition, reconnaissance equipment sufficient

for seven days at a stretch. I would like the R&D units to bring down the payload weight of the soldier on patrolling by 50% keeping the calorific value, nutrition, weather protection and fighting ability for enhancing his endurance and survivability.

I have visited command hospital at Chandigarh, where I had the opportunity of interacting with the scientists, Army Medical Corps doctors exploring the therapeutic applications of Aloevera cream along with allopathic remedies for the medical management of cold injuries. I was happy to see the patients who have been benefited by this holistic treatment.

By the deployment of large volume of troops, there is a possibility of environmental concerns regarding its degradation. Damage to Siachen glacier is the damage to water reservoir of the region. It is essential for all of us to maintain and preserve the glacier in its virgin form. Scientists have successfully developed the bio-digesters by identifying suitable microorganisms, which can handle the human waste even at these extreme temperatures. The greening of Ladakh region has also been another successful endeavor of the scientists and the soldiers along with the farmers. We should continue these efforts.

Survival of the Siachen glacier is very important for the nation since it is our water reservoir. I would like the Army to take this up as a mission and keep the glacier ecologically safe, as Army has always done in various units and installations in different sectors for enhancement of ecology. Any deterioration of the glacier will be detrimental to our water resource and ecology.

I would like to share with you a philosophic thought, in this divine Himalayan ambience. I believe God creates every living being with a mission and specific purpose. You are fortunate to have been blessed to be in a position to perform a noble mission of defending the nation as soldiers. When I see you, you all look very smart, you look combat ready and through gracious smile in your faces you look winning.

Maintaining peace in Siachen sector is and will be due to your valour and strength. Your defense capability will pave the way for the nation's progress. Maintaining peace in our borders has a tremendous impact in progressing the economic development of the nation at a faster pace.

Indian Air Force : Partner in Integrated Warfare

I AM INDEED very happy to be with you, Airmen, Warrant officers and Officers at Pathankot Air force station. I would like to congratulate you for the excellent work that you are doing for ensuring the security of the Nation. I found that in this theatre of operation (J&K and Ladakh), there is a close coordination between the Army and the Air Force. This system of integrated functioning of the various arms of the services brings the force multiplier effect to our armed forces. Western Air command is a very important command, which is spread in the whole of J&K and Ladakh. You have many types of aircraft with MiG series as the primary work force.

I visited Thoise airbase on 2 April 2004. I was briefed about the Air force contribution to Operation Meghdoot. During my short stay at this air force station, I visited the war memorial and paid homage to many dedicated air force personnel who had laid down their lives while defending the integrity of the Nation. They have left a great tradition of sacrifice for all of us to follow. Also I went to the school and interacted with bright young children who are bubbling with enthusiasm and energy. Finally before reaching here, I witnessed the airfield strike and air defence demonstration of this unit, which gives me an insight into the precision strike capabilities of Pathankot Air Force base.

I am sure, the fighter aircraft deployment at this Air Force base with the modern weaponry and electronic warfare systems will bring forth new dimensions in the modern air warfare. Also the reconnaissance aircraft have to be mounted with Ground Penetration Radars and Synthetic Aperture Radars for enabling detection of crevasses and enabling photography penetrating the clouds for the safe movement of Jawans on patrol, particularly when you give support to forward troops.

High altitude UAV systems need to be added with appropriate sensors for reconnaissance operations. For enhancing air defense capability there is a need to induct Akash system at an early date. The induction of Airborne Warning and Control Systems would enhance your surveillance capabilities manifold. Up-to-date intelligence in the battle field is an important input in our strategic planning. Today, semi-autonomous palm sized aircraft for surveillance is a reality. I am sure with your dedication and foresight, you will soon work with the nation to obtain these capabilities. Even biological vehicles fitted with cameras and trained for sustained long endurance flights can be used for surveillance. These surveillance systems along with agile fighters, attack helicopters and advanced surface-to-air-missile systems, will provide force multiplication in various dimensions to improve the total combat effectiveness.

Future warfare is an integrated warfare of Army, Air Force and Navy. This has come out very clearly during the Kargil operations. Timely deployment of Air Force was one of the key reasons for early decisive success in that operation. Many of you would have participated in that operation. I congratulate the Air Force team for the remarkable combat performance during the Kargil Operations. Communication and common data interchange framework are the backbone of Integrated warfare. Time has come for the training to include joint operations in a seamless way. I am sure you are providing similar contribution to the army in this sector with the fighters, attack helicopters and SAMs.

When I see Corporals, Sergeants, Warrant Officers and other officers, I am reminded of my early career in defence. While I was posted at Aircraft Armament Testing Unit, Kanpur, in 1958 I had worked with many of them and seen their dedication, commitment and specialization in work. Later, when I was Scientific Advisor to Raksha Mantri, I was the Chairman of the Committee on Fighter Aircraft Accidents (COFAA). As a part of this committee's work, myself and other members of the committee had visited almost all the Air Force stations in the country. The committee had made about ninety recommendations for implementation by various agencies. I am happy to know that almost all the recommendations including training have been accepted and many of them have been implemented. Also the process of AJT acquisition has commenced. But whatever be the state

of the art of the equipment, you are the integral part of the Air Force who can make sure that the fleet is always up and trouble free. During the deliberations of COFAA (Committee on Fighter Aircraft Accidents), I happened to see the log books of many MiG aircrafts having the signature of master warrant officers, sergeants and corporals reporting the aircraft status after every flight. If all of you and other concerned agencies make it a habit of attending and rectifying the problem at the right time our air force will definitely have the unique record of nearly accident free operations.

When I see you all in your uniform, you look very smart, you look combat ready and you look confident to face any situation and win. I am fully aware of the difficult environment in which you have been operating and carrying out your duties meticulously to support the army operations in this sector. It is essential to continuously modernize the equipment and add force multipliers to enhance the operational performance and improve flight safety.

It is recognized that this Air Force base has taken active part during 1948 and 1971 wars. You have also made excellent contribution during the Operation Safed Sagar and Operation PARAKRAM. The squadron aircraft are flown and maintained with passion and professionalism. You maintained the fleet at an instant state of readiness since you have been nominated as the core squadron of Western Air Command. In addition to your air defence duties you also undertake counter surface force operation in the hills. I was told that the unit is currently focused on sharpening the night fighting capabilities bestowed on you by cost effective night vision suite. In addition to providing support to Indian army personnel, your unit has also participated in several UN peacekeeping missions.

Twenty first century soldier will encounter a highly technology intensive battlefield, like high demand on agility, fast and accurate cognitive processing ability, high mobility, quick reaction and stable emotional profile. The selection process should define such a futuristic combatant personality and evolve an appropriate system to select personnel for the Air Force and upgradation of existing teams. The placement of soldiers in the appropriate task will require skillful aptitude testing. Food during combat needs to be lightweight with high-energy

concentration and ability to sustain vigilance and enhanced cognitive responses. Nutraceuticals and food supplements can be used as mood enhancers for improving sustained operational efficiency. Smart clothing with ability to adjust to the environment fitted with GPS, micro computer, vital physiological function sign monitoring, excellent communication system, NBC protective when needed, and powered by micro-fuel cell, light weight bullet proof jackets using new composites materials need to be developed. The survivability, sustainability, efficiency and lethality of the airmen and soldiers as a system need to be ensured for the victory in a future war, which will require joint services operation.

I am confident that you will continue the tradition of your success and valour in all your future operations. The entire nation is with you and leads you to modernize and force multiply all your aerial platforms and ground support systems, so that you will excel in the aerial warfare. Indian Air Force is indeed the angels for our ground troops. I thank you for keeping a vigil with sleepless nights so that the Nation can go to sleep every day in peace.

Improving the Health and Efficiency of the Soldiers

I AM DELIGHTED to participate in the inauguration of 53rd Armed Forces Medical Research Conference organized by the Armed Forces Medical Services. I greet the specialist doctors, scientists, technologists, pharmacologists, medical support personnel and distinguished guests participating in this conference.

I have been closely involved in the collaborative research activities between the life science research scientists of DRDO and armed forces research team. During the last two decades this team has contributed in improving the health and operational efficiency of the soldiers. During the next two decades, the crucial development will take place in science and technology, particularly in life science area. Fortunately DRDO's Life Sciences Research Board has given due importance to various present and future requirements of the armed forces. In today's discussion both the Armed Forces Medical Research Committee and Life Sciences Research Board of DRDO are to consider certain priority areas and focus their developments. The results should be useful and beneficial for our soldiers.

Health care of Armed forces is quite complex in war time and also in peacetime. War time the type of injuries mostly head oriented and also below the hip, the typical problem immediately would be attended are protecting the eye, brain damage and bone repair. Attending the cardio vascular system in right time. In peace time attending the orthopaedic reconstruction, retina replacements and liver damage. Right type of blood availability and timely blood transfusion and revival. In long term transplantation of liver, eye, plastic surgery.

Keeping this in mind, I would like to talk to you on 'Let my Brain Remove the Pain'.

Address during the inauguration of 53rd Armed Forces Medical Research Conference (AFMC), Pune, 1 February 2005

As per one of the studies, only 8% of the world population has access to heart surgery delivery systems. Out of the 6.5 lakh surgeries taking place in a year, 4.5 lakhs are performed in USA alone, only 2 lakhs are performed in the rest of the world. In India, fifty to sixty thousand operations are performed every year, whereas possibly 2.5 million people may need heart operations in India. Even though armed forces personnel are less susceptible for cardio vascular ailments, but injuries in the heart regions due to war time operations and also due to reduced physical activity in the peace stations the incidence of cardio vascular diseases are noticeable. Another observation is that the occurrence of coronary artery diseases in India is taking place between the age group of 35 and 55, whereas in the western world, it generally occurs after 55 or 60. The main reason for this in India is attributed to the urban life style and intake of rich food having high cholesterol. It is also found that the occurrence of cardiovascular cases is 4% in rural area as against the 10% found in big cities in India. Whereas the world statistics says that the incidence is only 3 to 4%. The genetic predisposition of Indian population for cardio vascular diseases needs to be given special attention. A research is essential for establishing the reasons for occurrence of heart ailments among Indians at a young age and also the reduced occurrence of the disease in rural areas. The results of the study will assist in national planning for combating the heart ailment.

Many Indian laboratories and hospitals are working in Research and Development of Stem Cell production. Advancement in stem cell research in the country has brought confidence among expert doctors to take up its clinical application in heart, eye, pancreas, liver, neural, kidney diseases and spinal injury.

Newer knowledge emerging out of research on stem cells from abroad and India has to be taken note of and studied. Drawing of tens of thousands of stem cell - immature cells that are capable of transforming themselves into almost any kind of tissues from the suffering patients and inject them into the heart to stimulate heart repair. In one case, it is reported that the pumping efficiency has increased from 25% to 40% over a period of four months. In 2004,

successful stem cell procedures that resulted in measurable boost in blood pumping capacity have increased substantially in many countries across the globe. This holds a big promise for effective heart repair for ailing people.

During my visit to various laboratories, I happened to see the beginning of stem cell research for different purposes including brain research. I would like to share with you an important stem cell research application in the field of cardiology. When I met Dr. P. Venugopal, Director, All India Institute of Medical Sciences (AIIMS) a famous cardiovascular and thoracic surgeon, he told me about his experiences. He said in one of the cardiac diseases, where conventional medical and surgical treatment were ineffective because of the affliction of the heart muscle, use of autologous bone marrow stem cells implantation into the diseased heart muscles had been applied in order to improve the function of heart muscle. This kind of application of this procedure is the latest and very few cases have been done in the world, such an application has been done for the first time in India. This is expected to open new frontiers in the treatment of patients for regeneration of heart muscles, thereby giving new hope for the patients suffering from terminal stage heart disease.

The New Scientist (dated 25th September 2004) has reported another remarkable recovery of a heart patient at the John Wolfgang Goethe University at Frankfurt. Of course for the first time, I have come across a warning, stating that risk is very high. Against stem cell solution for every aspect of human disease, it is reported that large amount of animal tests is needed before applying it on humans.

The recent identification and characterization of progenitors with stem cell properties has opened new avenues that may be useful for treating functional impairments caused by the death of specific cell population. Stromal and neuronal degeneration are the causes of debilitating visual impairment associated with many ocular diseases, such as degenerative diseases of cornea, retinitis pigmentosa (RP), age related macular degeneration (AMD) and glaucoma. The stem cells may help restore vision in patient who has these diseases, by repopulating or rescuing the damaged ocular surface cells or retinal cells from further degeneration.

The stem cell team of LV Prasad Eye Institute, Hyderabad has administered stem cells in the affected region of the eye for over 200 patients and all of them are performing very well. Apart from India, patients have come from Bangladesh and Nepal. The research in this frontier area is facilitated by quality research publications.

On 4th January 2005 during the Indian Science Congress, I had a discussion with the researchers and clinical physicians who are working in Stem cell area. They are working in different areas of stem cell, such as Cancer treatment, ophthalmology, spinal cord, cardiology etc. Details of some of the success stories and experience were shared.

Dr. Bhan, Secretary, DBT and Dr. Ganguly, DG-ICMR is working together in promoting stem cell research. They are evolving a road map for stem cell research through three areas such as adult stem cells, umbilical cord stem cells, and embryonic stem cells. A focus has been given to stem cell research so that a mission mode operation can soon commence. I was happy to note that the clinicians are driving the research; this will enable easy technology transfer and fast diffusion of technology. I understand that the Armed Forces have already started work in stem cell areas in two of their institutes and have created infrastructure both for research and clinical operation. I would suggest the members of Armed Forces Medical Research Committee to participate in the National Stem Cell Research and Application Programme.

Indian population is highly susceptible for coronary heart diseases that too at a relatively young age irrespective of where they live. As you are aware, Gene Chip arrays have tremendous potential to reach goals from identifying genetic variations associated with heart disease for discovering new drug targets.

Recently, I was in Chennai at Dr. Cherian's Medical Centre. It is known as, International Centre for Biomedical Sciences and Technology (Research & Applications). There I interacted with Dr. Emmanuel, who is working in the area of Gene Chip. He says the Gene Chip can be used for finding the existence of genetic diseases including coronary artery diseases in the baby during a certain

stage of pregnancy itself. The Armed Forces Medical Services can consider incorporation of the gene chip mandatory test during the prenatal screening which I am told is regularly being done for all antenatal cases.

As many as 50 different mutated genes are identified as responsible for heart problems in Indian population. If a person is not having any of these harmful mutated genes, then he may not suffer from heart ailments. The Gene Chip is one which on contacting with the blood, immediately identifies the mutated genes in the person. Based on this information, proper guidance can be given to the patients and parents. The chip could also be modified to suggest to the patient's system to develop those chemicals which in turn will help the patient recover from the present situation.

It is reported that gene differences between humans and most animals are very nominal. More than 90% of our DNA is similar. This property is a boon to researchers since animal models can be subsequently used for curing human diseases based on trial data. It has also been found that Gene Chips can be used for early diagnosis of tumors and their treatment. Integrating molecular biology, cytogenetics and bio-chemistry, bio-chip technology is regarded as one of the greatest inventions in the research of gene functions. It is far superior to molecular biological technology in terms of speed and accuracy. I would recommend the medical researchers assembled here to work in this area for finding the application of Gene Chip as a diagnostic tool and as a treatment regime for many diseases.

Recently I met Prof. Vijay K Varadan of Pennsylvania State University, USA. He shared his experience on the possible line of treatment for Parkinson's disease and Epilepsy. The primary symptoms in Parkinson's Disease as you are all aware are tremor or trembling in hands, arms, legs, jaw, and face, rigidity or stiffness of the limbs, slowness of movement and impaired balance. Prof. Varadan has devised a wireless system for monitoring and control of Parkinson's disease. The system consists of an implantable DNA insert (CNT probes) in the head region for generating a pulse to the nerve system; controlled either by a modified pacemaker or smart hat having passive polymer

based gyro sensors, which are implanted in the tremor location. The sensor gets the power from the Pacemaker and the Pacemaker then reads the tremor motion to generate pulse in the implanted device in the head to control the tremor. This appears to be a promising line of treatment for such diseases. Prof. Varadan also has reported that a few patients affected by Parkinson's disease had full recovery. Such medical intervention is also being done by Jaslok Hospital in Mumbai and AIIMS at New Delhi. Can the medical community explore the possibility of using a combination of stem cell and gene chips as a line of treatment for Parkinson's disease or epilepsy. During military operations it is possible that some of the soldiers get head injury affecting the brain in many ways and they need advance treatment through convergence of technologies like the trio of bio, nano and information technologies. I would suggest Armed Forces Medical Specialists to have collaborative programme with All India Institute of Medical Sciences (AIIMS) and other medical institutions working in this area for promoting rehabilitation treatment for our soldiers.

One of the important areas, where I would like the Armed Forces Medical Community to concentrate is on the containment of HIV/AIDS. Efforts are being made all in the West to develop not only the retro-viral drugs for combating the disease but also to develop a vaccine for the prevention of HIV/AIDS. Here again, countries like India would have to fend for themselves because, I am told, that the AIDS virus which is prevalent in our country is of a different strain from that which affects the West and Africa. As such, our research institutes and professionals would require developing their own drugs and vaccines to combat these strains of AIDS/HIV virus. As far as India is concerned, I am told that the anti vaccine for HIV/AIDS is in the advanced stage of development and getting ready for clinical trials. This programme needs highest priority from multi work-centres including armed forces hospitals in a mission mode. We may need to explore developing a vaccine which will have therapeutic application against a wide spectrum of HIV strains prevalent among Indian population. I am happy to know that the Armed Forces Medical Services has been sensitive and proactive to this dreaded disease and have created their own surveillance criteria as well as a very comprehensive information, education and

communication network. In addition, the Armed Forces I am told have many firsts in the fight against HIV/AIDS and is the first organized sector in the country to have introduced ART (anti-retro viral therapy) for all the personnel and their families as well as 100% screening during the antenatal checkup. This has resulted in the containment of the virus among the troops and today the number of cases reported annually is on the decline. In the anti HIV vaccine development and the clinical trials, AFMRC needs to become a partner.

During military operations a number of people are disabled and immobilized. Also, immobilization takes place due to adverse environmental conditions. It is essential to carryout research on special rehabilitation methods to provide near normal performance efficiency to the soldiers, sailors and airmen affected by enemy action. Major loss is of the limbs. In line with this, I have been informed that the Armed Forces have an artificial limb centre established at Pune which has done pioneering work to provide better, stronger, lighter and more durable appliances for the soldiers and the citizens of the country. In addition to this, the personnel posted at high altitude, counter insurgency and other isolated areas experience psychological problems. We have to design special debriefing techniques for personnel returning from difficult areas so that we can assess the psychological conditions and provide them counseling and other psychological support for enabling them to lead a normal life in the society. This is an inter-disciplinary area requiring active research by physiologists and psychologists. I am told that AFMS has already developed a comprehensive capsule for managing combat stress. This activity has to be intensified for continuously improving the rehabilitation package for the soldiers.

The Human system is an example of a perfect design in the biological evolution. It has been designed with high precision. The mankind is attempting to reach the precision of human system in mechanical system design and electrical system design. This may become possible with the advancement in nano-science and technology. With this approach the future in medical science will lead to health repair instead of being healthcare. There will be more and more replacement of damaged system and parts, both artificial and naturally grown through the use of implanted stem cells. Some of the examples

are Cochlear implants for hearing impairment and televised signals for eye impairment through vision cameras to reach near normal enablement. Also, the medical science is advancing to target the medicine with precision through bio-nano-robots which will treat the patients and finally the robot will get digested. The medical research community has to work in these frontier areas for improving the life style of the mankind needing such reconditioning.

During military operations a number of casualties takes place, much ahead we have to have a biological organ bank. We have to adopt a system and work out a drill so that we can collect the healthy organs from the casualties with speed and store it in a bank for use by needy patients. Example bone marrow for high radiation treatments, umbilical chord stem cells for tissue regeneration. Such banks will help to restore vision, transplant of liver, kidney for the cure of patients in an effective way. AFMS may consider creation of such biological organ bank and carryout research for long term storage. For example, I understand that Wisconsin University has succeeded in finding a new solution which can preserve the harvested liver for 24 hours instead of the present 5 to 12 hours. Our researchers need to take note of this development and work for increasing the preservation time of the harvested liver.

Our Armed Forces have a number of hospitals and healthcare units spread in many parts of the country. They have specialists in almost all areas of medical science. I understand some hospitals have installed tele-medicine facilities. I would recommend creation of network of all hospitals through tele-connectivity and conferencing atleast once in a month, so that the clinical data pertaining to various ailments and diseases, can be shared by all the hospitals and specialists. In addition, it will be useful to have presentation of case studies by different specialists when they find special type of ailments and provide innovative treatment to the patients. This research committee can also encourage service personnel to ask questions through the tele-medicine systems to the panel of specialist's doctors and find a solution to their problems, particularly the health centres and mobile clinic centres of armed forces which are located in the operational areas should be tele-connected to share in real time. This will enable the patient to

have the benefit of advice from doctors with varied experience and arrive at a treatment regime for complex cases. I understand the AFMS have already networked the healthcare establishment in Northern Command with Army Hospital Research and Referral in Delhi. This facility can be extended to all the military hospitals in the country in a phased manner.

DRDO has over ten laboratories working in life sciences area. They work in different areas such as nuclear medicine, thyroid, nutrition, bio-medical systems, virology, agriculture, clothing and shelter for high altitude and difficult areas. Although there is a good working relationship at the institutional level what is needed is connectivity between the working scientists, practicing doctors and the clients without the organizational barrier. This intensified association will provide an opportunity to have close interaction between researchers and clinicians which is vital for the development of drugs and fast clinical trials for application of drugs to provide better healthcare to the mankind.

DRDO has successfully developed an antigen based typhoid detection kit, which can quickly diagnose within about 5 min, the typhoid organism, whereas conventional kit takes 3 to 5 days, since it is antibody titre based. This technology has been transferred to excyton for upscaling and commercialization. Similarly, for cancer treatment analog glucose (2-de-oxyde-glucose) developed by INMAS as radio sensitizer has been transferred to Dr. Reddy's laboratories for production and commercialization. Since the product patent policy implementation is at our doorsteps, such indigenous efforts are mandatory to ensure availability of affordable healthcare to our population.

Research requires persistent effort. One of the problems faced by AFMS is the constant posting of doctors from one station to another and one type of hospital to another. This, to a certain extent, comes as a problem for maintaining the continuity in research. What is needed is a system by which the doctors can work from any station any time by having tele-education connectivity between all hospitals and work centres for continuing medical education, training and research. The complex operations taking place in different medical centres can be broadcasted through tele-medicine link to the trainee doctors. This is

now possible with the availability of our own satellite for education (EDUSAT) and broad band connectivity available till the block level across the country. This facility must be made operational in mission mode to overcome the problem arising out of periodic posting of medical community. This facility will also enable better interaction between the AFMS and corporate, private and government hospitals leading to the enhancement of the scope of their association and contribution to the medical science. In addition to the existing research programmes, AFMRC in partnership with DRDO can consider undertaking a multi-disciplinary, multi-institutional mega programme for management of infectious and water borne diseases. I am happy to inaugurate the 53rd Armed Forces Medical Research conference and wish the members all success in thier research missions.

Restoration of Car Nicobar after Tsunami

I AM INDEED delighted to be with you in this beautiful environment. My greetings to all Officers, Warrant Officers and Airmen of Air Force Station, Car Nicobar. I have been closely monitoring the status of this Air Force Station during the Tsunami devastation on 26th Dec.2004. I was shocked to know that valuable lives of 116 officers, men, support employees and families posted in this station were lost due to the fury of the nature. I pray to the Almighty to give strength to bear the loss to those who lost their kith and kin during this devastation. Inspite of the traumatic situation, Wing Commander BSK Kumar with his co-pilot and technical staff flew number of sorties, winched-up people through hovering at very low altitude and saved over 350 lives. I also understand a 13 year old girl Meghna Rajasekhar lost her father, mother and brother and was brought to the Air Force Station after a lapse of 48 hours by the tribals from Kakana village. She is now living with her grandparents at Secunderabad. Due to Tsunami the area of the Air Force Station has shrunk from 500 acres to 350 acres. I am sure very soon the Air Force Station will be able to get the additional 150 acres for bringing the Station to its original state. Now in record time the Car Nicobar runway has been restored to its original position, in which any type of aircraft can land. My congratulations to the construction engineers and the Air Force team for realizing this mission.

The Government is well aware of hardships being faced by our defence personnel deployed in these areas. We are making all out efforts to improve the quality of life of our Air Force personnel operating in such far flung areas. Presently, due to non-availability of certain infrastructure like schools and colleges, this station has been declared as a non-family station. Very soon, I am sure adequate infrastructure and facilities will

come up and we will be able to revert back to its earlier status. Reconstruction of Houses and other facilities have been undertaken with a new design which is capable of withstanding any type of natural fury. Meanwhile, apart from providing opportunity to speak to your families, efforts to send more men on leave by air are some of the measures being taken to improve the quality of life.

I would like to assure you that the entire Nation is with you in this honourable duty. We are all very proud of the our Air Force and its achievements.

Finally, I wish you all the very best and may you all succeed in all your future missions. I also take this opportunity to greet your families.

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The present volume is a compilation of the speeches of Dr. APJ Abdul Kalam, the 11th President of India. His speeches during January, 2004 upto December, 2005 lay emphasis on education as the most important element of growth and prosperity of a nation. This he feels could be achieved only through an education system which focuses on inculcating high moral values among the citizens and creating productive employment opportunities for them.



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